Hamilton City Council

HCC Central City Reservoir Project

Construction Transport Assessment

August 2025

Document control

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1. Introduction

1.1 Purpose

Hamilton City Council (HCC) secured Government Infrastructure Acceleration Fund (IAF) support for specific infrastructure projects in November 2022. The purpose of the IAF agreement is to support the development of critical infrastructure that facilitates the delivery of increased residential housing density in the central city. The Reservoirs and Pump Station project (**Project**) is a critical infrastructure initiative aimed at improving the efficiency of water supply from the reservoir into the central city, thereby supporting residential and commercial/office development along with firefighting water pressure requirements.

This Project is essential to meet the demands of a growing population. Current growth projections and modelling indicate that a 25 megalitre reservoir will be sufficient to meet population growth until at least 2041. Beyond that point, a second 25 megalitre water reservoir is required to maintain continued service capacity.

HCC in its capacity as a Requiring Authority (HCC) is presently undertaking the planning work for both reservoirs but will only construct one reservoir under the Agreement. The design and construction of the second reservoir will be determined in future in response to population growth in the central city.

HCC has conducted a comprehensive investigation and site assessment to identify a preferred location for the new reservoirs and an associated booster pump station.

HCC has identified the Ruakiwi Road Reservoir (RRR) site as the preferred location for the two new reservoirs and is preparing a Notice of Requirement to alter the existing designation to accommodate the new infrastructure.

HCC has commissioned Bloxam Burnett & Oliver Limited (BBO) to prepare a Construction Transport Assessment (TA) to support the Notice of Requirement application. This TA provides an assessment of the transportation effects associated with the construction, establishment and operation of the two reservoirs. The report also assesses the safety effects of the proposed site accesses, including factors such as visibility and vehicle tracking.

1.2 Project Site Location

The site is located at 18 Ruakiwi Road, in central Hamilton. It is bounded by Ruakiwi Road to the east and Hamilton Lake to the west, as shown in **Figure No: 1**. The site presently accommodates a single water reservoir that services central Hamilton.

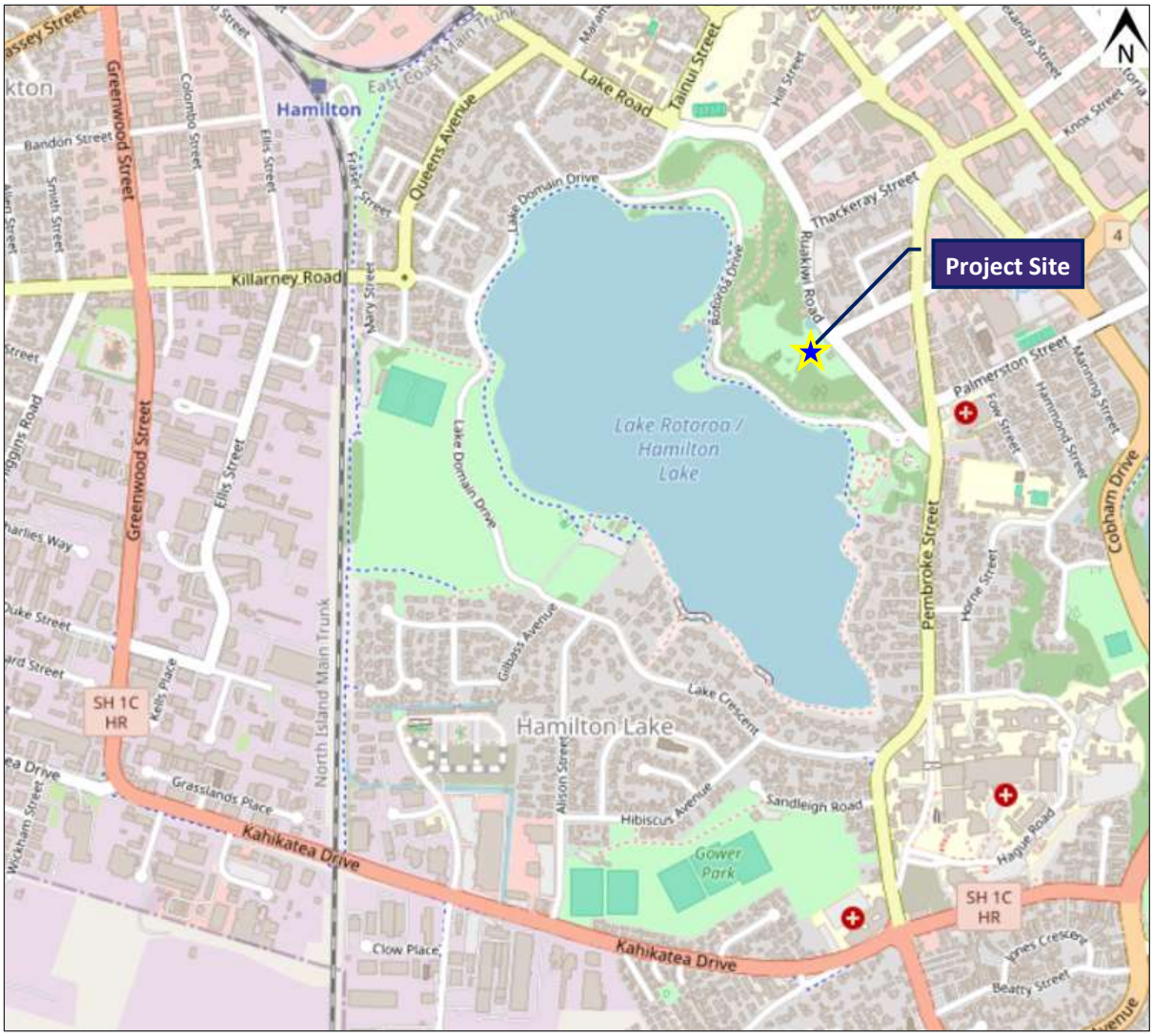

Figure No: 1. Site Location and Road Network

2. Proposed Works

2.1 Project Description

The Project includes the following four key components:

- Reservoirs: 2 x 25 ML water reservoirs to be located at 18 Ruakiwi Road (the Site). Development of each reservoir is to be staged with the first 25 MLD reservoir to be delivered by 2028 and the second reservoir to be delivered circa 2041.
- Valve chamber: Located on-site, between the reservoirs, to support the operation of the reservoirs.
- Ancillary pipelines: Includes scour discharge pipeline to Lake Rotoroa and connections to public three water systems from the site.
- Booster pump station: A booster pump station at 139 Clarence Street. Noting a separate land use consent is being sought for this aspect of the Project, thus, it is not subject to the NoR application.

The locality of the subject site is shown in **Figure No: 2**. These reservoirs are being developed as part of the city's long-term water infrastructure improvement strategy to meet increasing demand, improve supply reliability, and ensure emergency storage capacity.

Figure No: 2. Site Locality

3. Existing Environment

3.1 Existing Road Network Environment

3.1.1 Overweight and Over-dimensioned Load Transport Network

The construction of the reservoirs will involve the transportation of various components, heavy machinery, and construction materials to and from the site. While most materials and equipment can be delivered using standard road-legal vehicles, some larger components will require the use of overweight or over-dimension (OW / OD) vehicles. As a result, special vehicle permits will be necessary to facilitate these deliveries.

The road network that will be used for heavy transport during Project construction is illustrated in **Figure No: 3**. This shows the designated OW / OD routes within Hamilton (solid red and green lines). It is expected that all heavy loads will be transported using the State Highway network or the identified OW / OD routes. Potential links from these designated routes to the Project site are indicated by dotted red lines from the north and dotted blue lines from the south.

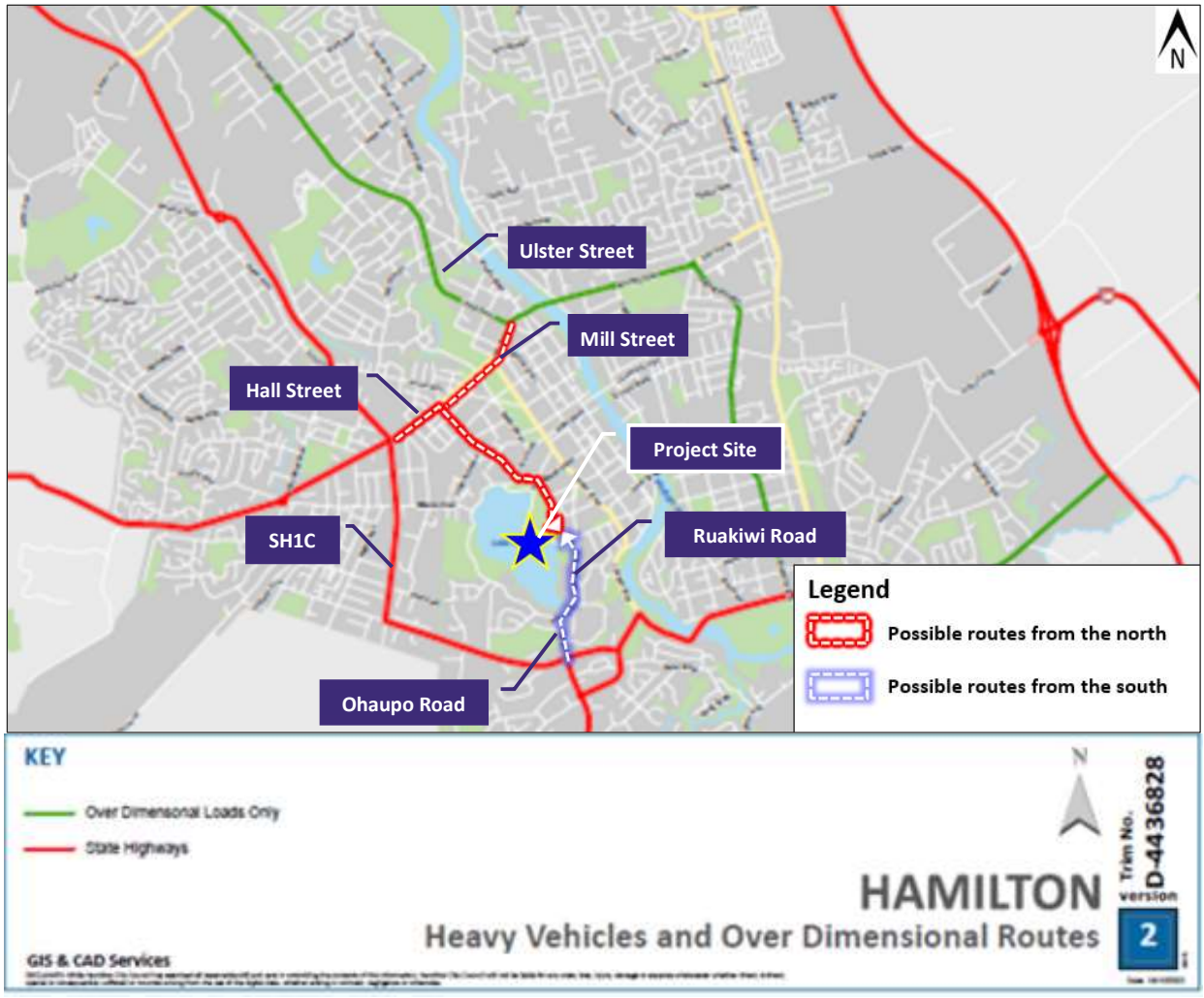

Figure No: 3. Overweight and Over-Dimension Transportation Network

3.1.2 State Highway 1C

State Highway 1C (SH1C) is classified as a Major Arterial Transport Corridor in the Hamilton City Operative District Plan (**District Plan**) transport corridor hierarchy. It is one of the primary north-south transport corridors through Hamilton, linking Auckland to the north and Cambridge to the south. SH1C is classified as an interregional connector road in the One Network Framework (ONF) and is identified as a heavy vehicle and over dimension transport route in the HCC bylaws and by NZ Transport Agency Waka Kotahi (NZTA). **Table No: 1** provides a summary of Average Daily Traffic (ADT) volumes and percentages of Heavy Commercial Vehicles (HCV) on the SH1C.

Table No: 1

SH1C – Traffic Data		
Section of Road	**ADT Volume (vpd)**	**HCV**
SH1C north of Killarney Road	46,525	12.3%
SH1C between Killarney Road and Ohaupo Road	24,136 – 27,515	6.3%
SH1C between Ohaupo Road and Cobham Drive	15,244 – 16,855	6.3%
SH1C east of Cobham Drive	29,452	4.4%

3.1.3 State Highway 1 (SH1)

SH1 - Waikato Expressway is classified as a Major Arterial Transport Corridor in the Hamilton City Operative District Plan transport corridor hierarchy. SH1 is classified as an interregional connector road in the ONF. Additionally, it is also identified as a heavy vehicle and over dimension transport route in the HCC bylaws and by NZTA.

3.1.4 Ruakiwi Road

Ruakiwi Road is classified as a Minor Arterial Transport Corridor under the District Plan transport corridor hierarchy. It runs in a northwest-southeast direction and will serve as the primary access route for construction and operational activities. It is classified as an urban connector in the ONF with a posted speed limit 50km/h. ADT volumes on Ruakiwi Road are presented in **Table No: 2**.

Table No: 2

Traffic Volumes (Mobile Road website)		
Section of Road	**ADT Volume (vpd)**	**HCV**
South of Clarence Street	6,982	2%
North of Clarence Street	7,276	2%
North of Thackery Road	15,181	2%

3.1.5 Pembroke Street, Lake Crescent, Ohaupo Road, Hall Street and Mill Street

Table No: 3 below shows the ADT volumes on the local road network that could be affected by the Project traffic including Pembroke Street, Lake Crescent, Ohaupo Road, Hall Street and Mill Street.

Table No: 3

Traffic Volumes (Mobile Road website & MegaMaps)					
Section of Road	Classification		Posted Speed Limit	ADT Volume (vpd)	HCV
	District Plan Transport Corridor Hierarchy	One Network Framework			
Pembroke Street & Lake Crescent	Minor Arterial Transport Corridors	Urban Connectors Roads	50km/h	13,260 - 17,600	6.0%
Ohaupo Road	Minor Arterial Transport Corridor	Local Street	50km/h	18,100	5.3%
Lake Road	Minor Arterial Transport Corridor	Urban Connector Road	50km/h	6,900 – 11,068	4.3%
Hall Street / Mill Street	Major Arterial Transport Corridors	Urban Connector Roads	50km/h	7,950 - 19,400	5.0%

3.2 Walking and Cycling

Ruakiwi Road has 1.5m wide footpaths on both sides of the carriageway, providing pedestrian connectivity to the walking and cycling shared path network around Lake Rotoroa. Dedicated cycle lanes are only available along Pembroke Street, with no formal cycling infrastructure currently provided on Ruakiwi Road.

Figure No: 4. Walking and Cycling around the Project

3.3 Public Transport

There are no existing bus stops or public transport (PT) services on Ruakiwi Road. The nearest bus stops are located on Pembroke Street, just south of Ruakiwi Road intersection. The stops are approximately 440 m from the subject site, which is considered a walkable distance for accessing public transport given that the typical maximum acceptable distance for walking is 0.8-1.2 km[1].

Figure No: 5 illustrates the bus stop location and the walking route to the site. The bus stops are served by several PT services from different parts of Hamilton, including the Orbiter service.

Figure No: 5. Public Transport Accessibility

[1] Walking | NZ Transport Agency Waka Kotahi

4. Crash History

4.1 Crash History along Ruakiwi Road Corridor

Crash data for the previous five-year period (January 2020 – December 2024) including available data for 2025 was sourced from NZTA's Crash Analysis System (CAS) and analysed to identify any road safety related issues on roads surrounding the subject site. Detailed crash record is provided in Appendix A and **Figure No: 6** below shows the crash record on Ruakiwi Road and **Table No: 4** for a summary of crashes for each year.

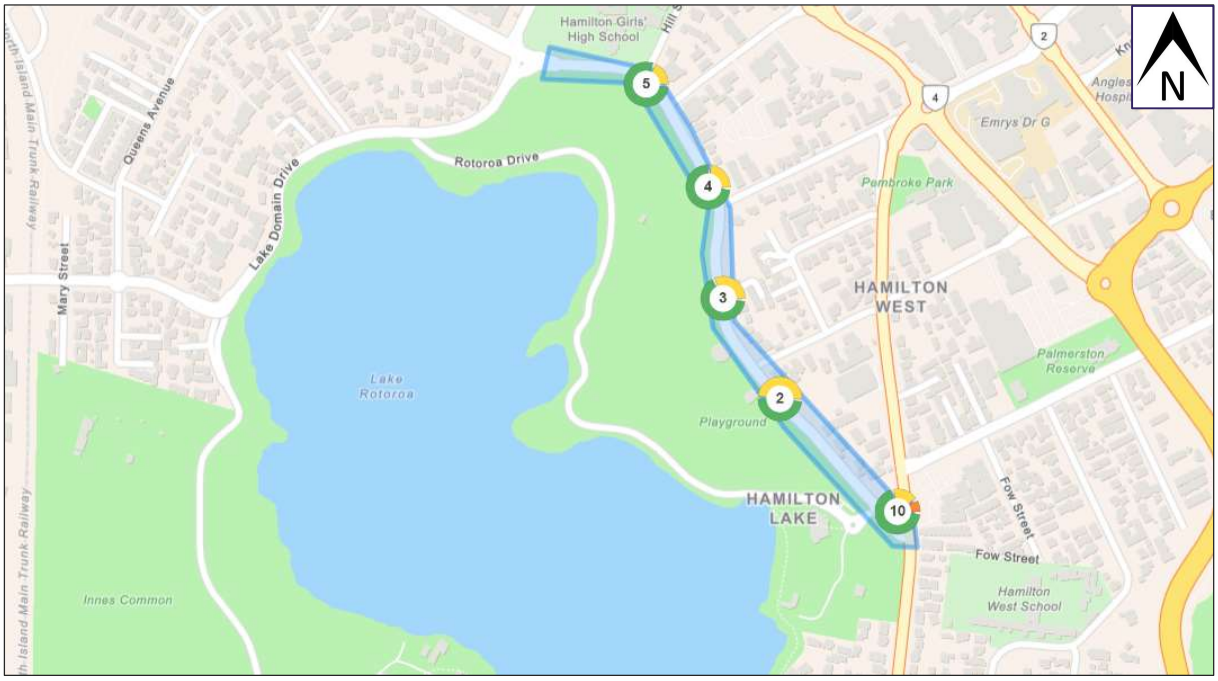

Figure No: 6. Crash Data History along Ruakiwi Road Corridor

Table No: 4

Crash History of the Study area from 2020 to 2025					
Year	**Fatal**	**Serious**	**Minor**	**Non-Injury**	**Total**
2020	0	0	3	6	9
2021	0	0	1	2	3
2022	0	0	0	4	4
2023	0	1	1	4	6
2024	0	0	0	1	1
2025 (Jan-May)	0	0	1	0	1
Total (Five Year)	**0**	**1**	**6**	**17**	**24**

A total of 24 crashes were recorded along the Ruakiwi Road corridor in the last five years. There was one serious injury crash, six minor injury crashes, and seventeen non-injury crashes recorded. A summary of the crash history is described below:

- In 2023, a serious crash occurred approximately 350 m from the subject site, near the intersection of Pembroke Street and Ruakiwi Road. The crash involved a vehicle colliding with a stationery bus while

attempting to evade the law enforcement. Therefore, this crash is considered abnormal and not reflective of standard road driving conditions.

- All other crashes were classified as minor or non-injury. Common contributing factors to these crashes included:
    - Failure to give way at priority-controlled intersections
    - Collision with parked vehicles
    - Loss of vehicle control
    - Rear-end crashes while vehicles are moving slow
    - Making U-turns from the same direction.

4.2 Crash History within 150 m radius of the Project Site

Four crashes were recorded within a 150 m radius of Ruakiwi Road / Clarence Street intersection in the last five years. None of the crashes occurred at the intersection itself and all these crashes are also included in the 24 crashes included in Section 4.1.

Of the four crashes:

- Two crashes occurred north of the intersection, approximately 50 m and 115 m away.
- The remaining two crashes occurred south of the intersection, approximately 50m and 70m.

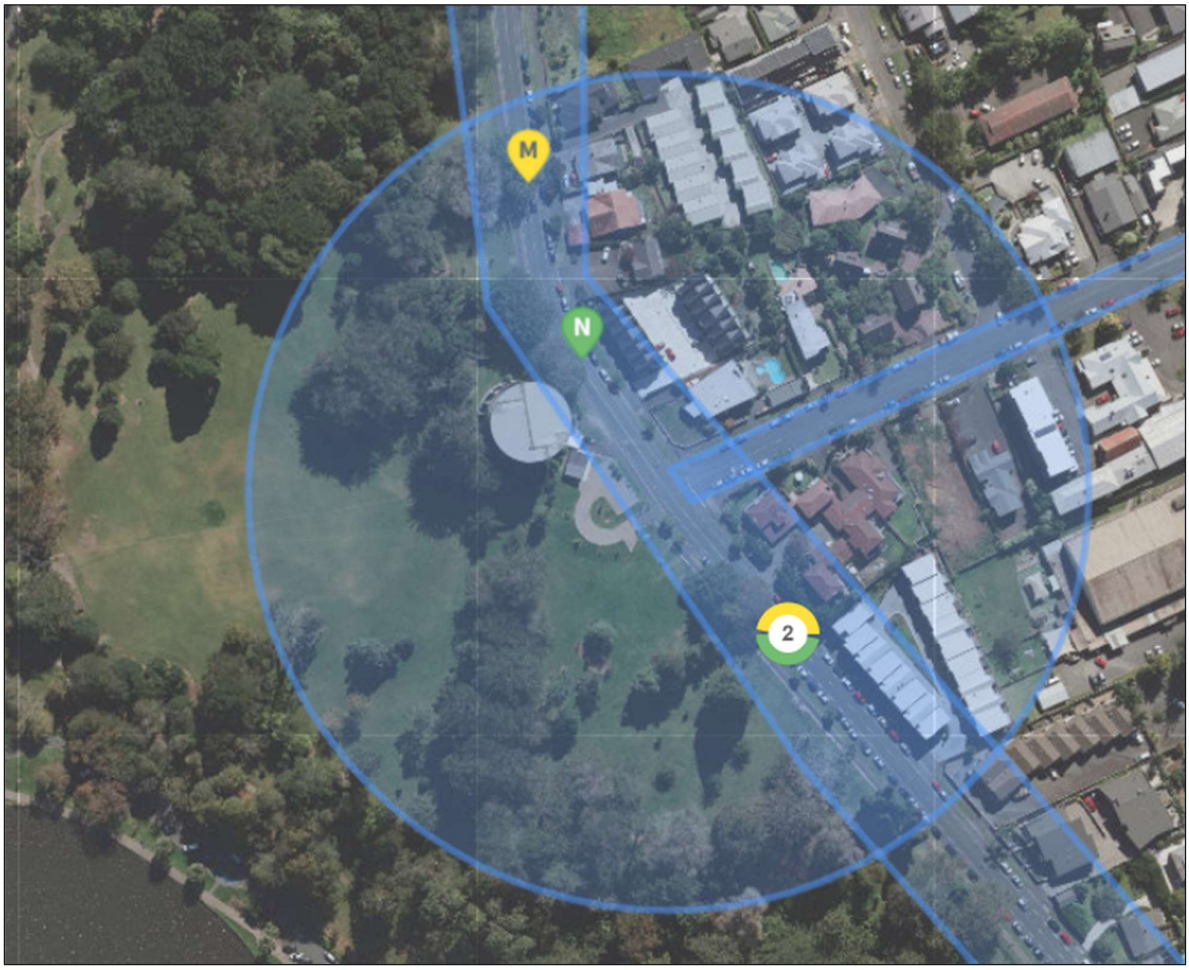

Figure No: 7. Crash Data History near the Subject Site

Of the two crashes that occurred south of the intersection, one involved a vehicle making a U-turn within the roadway which resulted in a collision with an oncoming vehicle travelling in the opposite direction. The other crash was classified as a road rage, where the crash report indicates the collision was intentional, resulting in a rear end impact.

The two crashes north of the intersection involved loss of vehicle control, with both vehicles veering off the road to the left. The crash report indicates that one crash was due to driver's fatigue during wet and dark weather conditions and the other crash involved a new driver distracted by a mobile phone, who lost control and collided with a parked vehicle.

Based on crash data, none of the recorded crashes occurred due to unsafe intersection or road surface conditions. Additionally, no crashes occurred within the intersection itself or involved vehicles turning from accessways along Ruakiwi Road.

5. Construction Methodology

The Project is expected to generate a significant number of heavy vehicle movements, particularly during the earthworks, concrete pouring, and equipment installation phases. Construction of each reservoir will generally consist of five phases each with activities as described in **Table No: 5**. Each construction activity is anticipated to take between 1 and 14 months to complete, and some of the activities will overlap.

Table No: 5

Physical Works Activity and Programme Summary					
Phase	**Activity**	**Estimated Duration (Weeks)**	**Maximum number of site staff**	**Start - end month**	**Notes**
Phase 1 – Infrastructure & Enabling Work	Site Establishment / Site Office	2	8	1-2	Phase 1 is expected to take approximately 1-2 months
	Improvement / Tree Relocation / removal	4	14	1-2	
	Road / Access Roads / Laydowns	2	14	2-2	
Phase 2: Bulk Earth Works	Topsoil Stripping, Bulk Earthworks cut Preload	8	7	3-4	Phase 2 is expected to take approximately 4-6 months and (Assumed that Phase 2 will overlap with Phase 3)
	Sheet Piling (200 piles)	2	11	5-5	
	Preload Settlement Period	16-24	18	5-10	
Phase 3: Stormwater Pipeline, Discharge mains & Valve Chamber	Lake outlet construction, scour pipe	12	18	6-9	Phase 3 is expected to take approximately 9 months (Assumed that Phase 3 will overlap with Phase 2 & Phase 4
	Drilling & installation (2 lines)	12	18	8-11	
	Valve Chamber Subbase, Floor, Walls, Cladding, Culvert + Discharge Pipework, Frame & Roof	16	18	11-12	
Phase 4 - Reservoir Foundation, Structural Works & Roofing Construction	Preparations: Engineered Fill, Pipework, Chambers, Remove Preload	8	22	11-13	Phase 4 is expected to take approximately 14 months and overlap with Phase 3
	Subbase, Floor, Wall Panels	6	22	13-16	
	Infill pours, Roof Beams, Construction	16	22	16-20	
	Pos-tensioning, Roof Pours, Finishing	22	20	20-26	
Phase 5 – Architectural Treatments	Backfill, Block wall	4	18	26-27	Phase 5 is expected to take approximately 4 months and overlap with Phase 4
	Drainage, paving, Façade Wall	8	15	28-29	
	Commissioning Works: Balustrades, Lighting, Stairways	6	15	28-29	
	Planting and Reinstatement	8	15	29-30	

5.1.1 Duration of Construction

The total construction duration for each reservoir is expected to take up to 30 months, with Reservoir 1 completing in 2028 and Reservoir 2 likely to be completed in 2041.

5.1.2 Working Hours

For this assessment, each activity during the construction phase is expected to involve between 2 and 10 personnel per day per activity. The numbers are expected to peak to 22 personnel during the structural construction phase including mechanical and electrical installation work overlap.

Most construction personnel will be transported to site by minivans or carpooling because there will be limited provision for on-site parking. The assumptions below are adopted for this assessment and are largely based on previous project construction experience and consideration of the limited vehicle manoeuvring and parking availability on site:

- Peak day traffic generation maybe up to 3 times higher than the average daily traffic generation.
- During peak construction periods, up to 75% of workforce will travel to site by shared transportation, such as vans and car-pooling.
- Construction staff generally arrive between 7:00am - 8:00am and depart between 5:00pm -6:00pm. There will be exceptions, such as reservoir foundation and roofing concrete pouring that may start early in the morning or continue into the night.
- It is possible that the Project construction activities may occur sporadically during some weekends to utilise good weather conditions, however, to be conservative this assessment has assumed a five-day working program between 7:30 am and 6:00 pm. The total annual working days used in peak day and peak hour trip generation calculations is 250 days per annum.
- Delivery trips will be evenly spread throughout the day to avoid queuing at the site access or offloading locations within the construction site.
- Large rigid trucks will be used in material and other deliveries which do not require special over-mass or over-dimension permits. This includes transportation of material such as road pavement aggregates and spoil from the Project site. OW-OD components including precast wall panels, wall panel stiches and valve chamber precast panels are expected to be delivered using a 19.45m articulated heavy productivity motor vehicle (HPMVs).

5.1.3 Site Access Strategy

Two construction site accesses are proposed on Ruakiwi Road, as illustrated in **Figure No: 8**. The proposed access locations are indicated by the red arrows. Site Access 1 will be located at RP (RP) 0.38, approximately 18m north of Ruakiwi Road / Clarence Street intersection and Site Access 2 will be located at RP 0.28, approximately 80m south of this intersection.

Figure No: 8. Proposed Site Access Points

Both access points are designed to accommodate full turning movements and will function as entry and exit points into and from the subject site. Each access will operate under site specific traffic management plan (SSTMP) during the construction phase.

Following the completion of Reservoir 1 construction, Site Access 2 will be decommissioned, and Site Access 1 will be sealed to formalise the access for the operational phase.

Reservoir 2 will only be constructed through Site Access 1, which will be designed to accommodate all site generated traffic for the construction phase. Upon completion of Reservoir 2, Site Access 1 will remain as the primary access for both reservoirs' operations and maintenance.

Section 6 provides further detail on the recommended design elements for the accesses.

6. Trip Generation

An assessment of the expected construction traffic generated by the Project has been undertaken and described in this section. The predicted trip generation for Reservoir 1 considers both the construction phase and the subsequent operation and maintenance phase. It is anticipated that the trip generation for the construction of Reservoir 2 will be comparable to that of Reservoir 1 and that no additional operational personnel will be required to maintain both Reservoir 1 and 2.

6.1 Transportation of Construction Material

Heavy traffic movements to and from site are expected to be minimal during the initial stages of the enabling works as the earthworks being undertaken on site comprise a cut to fill operation. Equipment and the majority of heavy earthworks construction vehicles are not expected to leave the subject site until those works are completed, which will minimise the amount of heavy traffic entering and leaving the site over this period.

Furthermore, it is anticipated that trucks delivering the fill or aggregate materials will be utilised to transport the cut-to-spoil material off-site. This dual-purpose use of haulage vehicles is expected to reduce the total number of heavy vehicle trips to and from the subject site (as indicated in blue) by approximately 50%. The indicative number of loads for each activity in **Table No: 6** were received from Holmes NZ civil engineers.

Concrete will be delivered to site during the reservoir construction phase of the programme. The number of concrete truck movements on any given day will be dependent on whether a pour is taking place on site or not. On days when a pour is taking place, it is expected that up to 16 heavy vehicle movements per hour could occur, though this intensity will be only for a day.

Table No: 6

Material Quantities and Associated Truckloads			Total Number of Loads / Trips per Phase		
Feature	**Material/ Item**	**Total Quantity No / m^3**	**Total No. of Loads**	**Number of Trips In**	**Number of Trips Out**
Access Roads / Laydowns / Access Intersections	Main Crane 200t	1	20	20	20
	Mass Block Walkway	3,000	300	300	300
	Mass Blocks	1000	200	200	200
	Miscellaneous – Crane establishment, pipework, scaffolding, retaining and concrete pumps, etc.	Loads	200	200	200
	Access and Laydown Areas – Pavement Aggregates	1,350m^3	170	170	170
Total			**890**	**890**	**890**
Structure	Bulk Earthworks	Cut = 13,650 m^3 + Fill subbase = 5,680m^3	1,700	1,700	1,700
	Concrete - Floor	1,200 m^3	200	200	200
	Foundation Nibs and Column Base	200 units	35	35	35
	Columns	44 units	22	22	22

Material Quantities and Associated Truckloads			Total Number of Loads / Trips per Phase		
	Precast Pannels	60 units	60	60	60
	Wall Panel Stiches	60 units	10	10	10
	Valve Chamber	400 m^3	70	70	70
	Valve Chamber Precast Panels	16 units	16	16	16
	Concrete - Roof	800 m^3	136	136	136
Total			**2, 249**	**2, 249**	**2, 249**
Final Works and Handover	Closure and Handover	Loads	300	300	300
Total Traffic for the Project – Construction Period			**3, 439**	**3, 439**	**3, 439**

6.2 Summary – Construction Traffic

The chart in **Figure No: 1Figure No: 9** illustrates the projected peak and non-peak average daily traffic generation for each construction month. The assessment identifies that construction activities are expected to peak around construction months 3-4 (Phase 1 and 2) which includes earth bulk works and 13-16 (Phase 4) coinciding with the reservoir base slab pouring activities. The traffic is expected to peak again in month 21-22 which involves the concrete pouring for reservoir roofing, where Phases 4 and 5 construction activities overlap. Phase 5 construction is expected to generate less daily traffic than the peak construction phases.

The non-peak month daily delivery trips have been estimated using proportional approach based on workforce levels, i.e. if there are 10 staff on site during a non-peak period and 40 staff are on site during a peak month, the staff trip ratio between the two periods will be 1 in 4. Applying the same ratio, the estimated non-peak period delivery trips will be estimated as a quarter of the peak period. This estimate does not impact on the transport effects assessment as it will be based on the peak hours during the peak construction months.

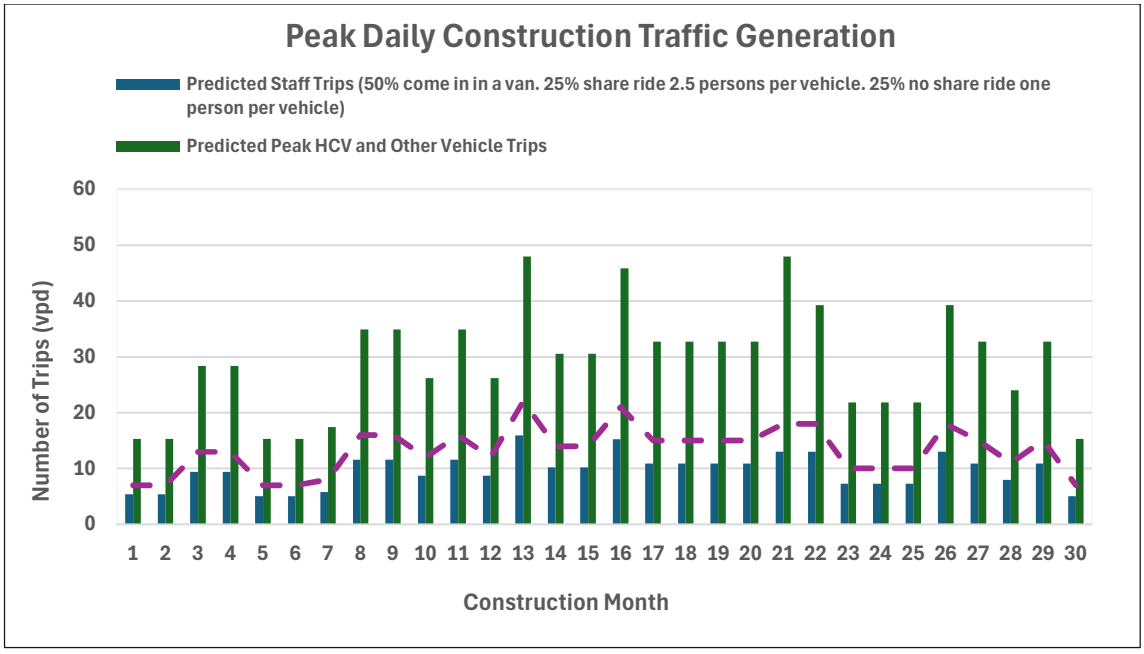

Figure No: 9. Phase 1 to Phase 5 – Month Daily Traffic Generation

Table No: 7 summarises the estimated hourly construction traffic volumes anticipated at site accesses during a typical peak construction day, which are likely to occur during the bulk earthworks. These figures do not include periods of operation that may occur for tasks such as large volume concrete pours. The key traffic characteristics are as follows:

- The peak hours are expected to occur between 7:00 and 8:00 am with 20 vehicle movements, and for each hour between 5:00 pm and 7:00 pm generating around 12 vehicle movements as shifts end.
- The two site access point will accommodate both staff vehicles and delivery trucks.
- Four truck movements per peak hour equates to one truck movement every 15 minutes.
- Estimated daily staff trips – 32 vpd.
- Estimated daily delivery trips – 48 vpd.
- Total projected peak daily trips – 80 vpd.

Table No: 7

Construction Peak Day Hourly Trips													
Total Peak Hour Trips	Hourly Traffic Volumes												Total Daily
	7:00-8:00am	8:00-9:00am	9:00-10:00am	10:00-11:00am	11:00-12:00am	12:00-1:00pm	1:00-2:00pm	2:00-3:00pm	3:00-4:00pm	4:00-5:00pm	5:00-6:00pm	6:00-7:00pm	
Peak Hour Staff Trip	16	0	0	0	0	0	0	0	0	0	8	8	32
Peak Hour Delivery Trips	4	4	4	4	4	4	4	4	4	4	4	4	48
Total Peak Trips	20	4	4	4	4	4	4	4	4	4	12	12	80

6.3 Maintenance and Operations Traffic

The operational phase post-construction will primarily involve servicing and maintenance of the reservoir. Operations which involve water level monitoring, flow control, supervisory control and data acquisition (SCADA) monitoring, water quality monitoring and security surveillance will be managed by a team of 1-3 staff. The maintenance of the reservoir can also be undertaken by a team of three staff members (one mechanical technician, one electrical technician and one maintenance worker) and the three support staff members (shared or part-time). Therefore, the total operational and maintenance workforce is anticipated to range between 5 and 8 personnel, depending on the level of automation.

Upon completion of Reservoir 1 construction, Site Access 2 will be decommissioned. Site Access 1 will remain in use for operational and maintenance purposes and be formed to meet the Hamilton City Operative District Plan (ODP) access design standards.

During Reservoir 2 construction phase, Site Access 1 will serve as the sole access point to site. The access will be widened to accommodate both staff vehicles and delivery trucks. After the completion of phase 2 construction, Site Access 1 will remain in use for operational and maintenance. It will be upgraded to comply with the Hamilton City Operative District Plan (ODP) access design standards.

7. Assessment of Transportation Effects

7.1 Overweight and Over-dimension Vehicles

Overweight and over-dimension deliveries are managed under their own processes including route evaluation and temporary traffic management planning, which would typically include at least pilot vehicles. Routes need to be approved by the local Road Controlling Authority. Details of overweight and over-dimension deliveries will be included in the Construction Traffic Management Plan (CTMP).

The layout of the Lake Road / King Street intersection to the north restricts the transportation of OW-OD components. The route from the south (SH1C) was found to have minimal issues and is therefore, recommended as the preferred route for OW-OD deliveries.

The routing will be further confirmed through the development of the CTMP, which will identify the appropriate management controls around the use of these routes. A draft CTMP will be prepared and accompany the final report. It will need to be updated, once the Contractor is appointed and when the details of the construction methodology and programme will be confirmed. Any effects on pedestrian refuge islands along the delivery route will be managed in accordance with site specific traffic management plan (SSTMP) to ensure pedestrian safety and minimise disruption.

7.1.1 South Route to the Project Site

This is a route from the SH1C to the subject site using Ohaupo Road, Lake Cresent, Pembroke Street and Ruakiwi Road (as illustrated by the dotted blue lines in Figure No. 3).

Ohapuo Road to Selwyn Street

Three pedestrian refuge islands are located between the SH1C and Ohaupo Road/Lake Crescent intersections as shown below. To accommodate the transport of large reservoir components, it may be necessary to temporarily remove the belisha beacons within the pedestrian refuge islands.

17 Ohaupo Road

9 Ohaupo Road

4 Ohaupo Road

Pembroke Street from Selwyn Road to Ruakiwi Road

Vehicle tracking analysis below confirms that the transportation of a large reservoir component with a 19.45m articulated HPMV will not result in any adverse effects at the Pembroke Street / Ruakiwi Road intersection and Pembroke Street / Selwyn Road intersection.

The southern leg of Pembroke Street at Selwyn Road intersection consists of two 3.1m width lanes as shown in **Figure No: 11**. This configuration can safely accommodate a 19.45m articulated HPMV through the intersection.

Figure No: 10. 19.45m truck passing at Pembroke Street / Selwyn Road Intersection

Figure No: 11. Northbound view at Pembroke Street / Selwyn Road Intersection

The southern leg of Pembroke Street at Ruakiwi Road intersection has a wide carriageway width of approximately 6.5 m and 3.3m wide traffic lane as shown in **Figure No: 13**. The existing intersection layout can safely accommodate the left turn in and right turn out movement of a 19.45m articulated HPMV through the intersection.

Figure No: 12. 19.45m truck turning at Pembroke Road / Ruakiwi Road intersections

Figure No: 13. Northbound view of Pembroke Street

Westbound view of Ruakiwi Road

7.2 Construction Access

7.2.1 Site Access 1

To facilitate the delivery of large precast panels and large pipes, a 19.45m articulated HPMV was used for the vehicle tracking analysis, as shown in **Figure No: 14**. The swept path demonstrates that the vehicle can safely undertake left and right turn movements into the subject site from Ruakiwi Road, as well as left and right turn out movements from the subject site onto Ruakiwi Road. The tracking analysis shows that a 10 m wide access is sufficient to safely accommodate a 19.45m articulate HPMV. If larger vehicles are to be used for deliveries, a separate tracking analysis will be required. This access does not impact any on-street parking spaces.

Figure No: 14 – 19.45m HPMV tracking analysis at Site Access 1 and onsite manoeuvring

7.2.2 Site Access 2

Site Access 2 is designed to accommodate an 11 m large rigid truck i.e 6 m^3 concrete trucks. **Figure No: 15** below shows that sufficient space will be available for on-site manoeuvring. The vehicle tracking analysis includes all turning movements and it confirms that a 6.0m wide access is adequate to safely accommodate an 11m large rigid truck.

To facilitate safe entry and exit at Site Access 2, approximately six on-street parking spaces on the western side of Ruakiwi Road should be temporarily removed for the duration of Phase 1 construction period (30 months)

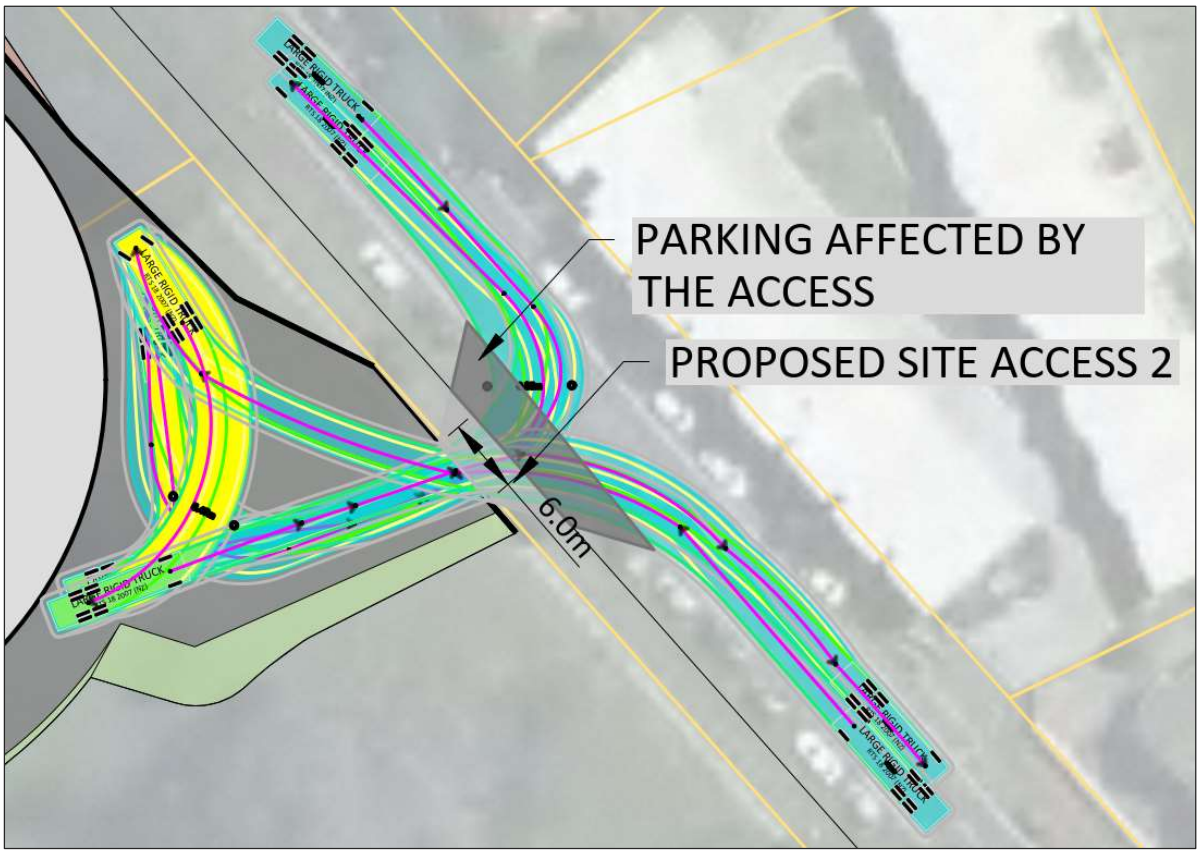

Figure No: 15 – 11m Large Rigid Truck tracking analysis at Site Access 2 and on-site manoeuvring

7.3 Road Capacity Effects

7.3.1 Construction Phase

The additional peak daily traffic movements during the Project's construction period are estimated in section 6.2. Due to the proposed site office location and utilisation of larger delivery vehicles, it is anticipated that the site generated trips will split equally to both access points during the construction of Reservoir 1, while Site Access 1 will be the only access for the construction of Reservoir 2.

As indicated in **Table No: 7**, the Project is expected to generate approximately 80 vpd and 20 vph during the peak periods. It is assumed that approximately 50% of site staff will come from the north via Lake Road and Ruakiwi Road, while the remaining 50% will arrive from the south via Pembroke Road and Ruakiwi Road. Delivery trucks are expected to approach the site from the south, consistent with the proposed access arrangements. Therefore, the effects of the site generated traffic on the adjoining road network are presented in **Table No: 8**.

Table No: 8

Increase in Traffic Movements during the Project Construction Period - ADT				
Road	Existing ADT Volumes from Mobile Road	Additional ADT Movements from the Project	Increase in ADT Volumes during the construction Phase	Percentage Increase in ADT Volumes during the construction Phase
Reservoir 1				
Ruakiwi Road North of Clarence Street	7,280	40	7,320	0.55%
Ruakiwi Road Ruakiwi Road South of Clarence Street	6,980	40	7,020	0.57%
Pembroke Street & Lake Crescent	13,260 - 17,600	64	13,324 - 17,664	0.36% - 0.48%
Ohaupo Road	18,100	64	18,164	0.35%
Lake Road	6,900 – 11,068	16	6,916 – 11,084	0.14% - 0.23%
Hall Street / Mill Street	7,950 - 19,400	16	7,966 – 19,416	0.08% - 0.20%
Reservoir 2				
Ruakiwi Road North of Clarence Street	7,280	80	7,360	1.10%

Based on **Table No: 8** above, there will be 0.47% to 0.57% increase in ADT volumes along Ruakiwi Road during Stage 1 construction phase and 1% increase during Stage 2. This increase will be spread over an 8-hr period and is considered to have a less than minor effect on the surrounding road network.

Based on Table 6.1 typical mid-block capacities for urban roads with interrupted flow in Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods (copied to **Figure No: 16**), the capacity of an urban road with interrupted flow and adjacent to parking lane is 900 passenger car units per hour (pcu/h). The guide suggests that a 2.5 pcu factor is adopted in traffic volume calculation for heavy commercial vehicles. Peak hour volumes are typically 10% of the ADT volumes, therefore, the peak hour traffic volume on Ruakiwi Road is estimated to be 736 vph. If the HCV is 2%, this yields a total of 759 pc/h (two-way for peak hours).Refer to **Table No: 9** on the next page.

Table 6.1: Typical mid-block capacities for urban roads with interrupted flow

Type of lane	One-way mid-block capacity (pc/h)
Median or inner lane	
Divided road	1000
Undivided road	900
Middle lane (of a 3 lane carriageway)	
Divided road	900
Undivided road	1000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

Maximum volume per lane, per hour

Figure No: 16 – Mid-Block Capacities for Urban Roads

Table No: 9

Increase in Traffic Movements during the Project Construction Period – Peak Hour Volumes				
Road	**Two-way Peak Hour Volumes (vph)**	**Two-way Peak Hour HCV (vph)**	**Two-way Total Peak hour volumes (pcu/h)**	**Total Peak hour volumes per lane (pcu/h/l)**
Reservoir 1				
Ruakiwi Road North of Clarence Street	732	15	754	377
Ruakiwi Road Ruakiwi Road South of Clarence Street	702	14	723	362
Pembroke Street & Lake Crescent	1,332 – 1,766	80-106	1,452 – 1,925	726 – 963
Ohaupo Road	1,816	96	1,960	980
Lake Road	692 – 1,108	30 – 48	737 – 1,180	369 – 590
Hall Street / Mill Street	797 – 1,942	40 – 97*	857 – 2,088	214 – 522
Reservoir 2				
Ruakiwi Road North of Clarence Street	7,36	1580	759	1.00%

*Roads with two lanes per direction

This assessment finds that the combined traffic on Ruakiwi Road and the surrounding road network, during the peak construction traffic hours will still be under the serviceable capacity of 900 pc/h/lane. However, Pembroke Road and Ohaupo Road which currently operate slightly above this threshold, with volumes of approximately 959 pcu/h/l and 977 pcu/h/l respectively. These high traffic volumes are typical patterns observed on urban roads during peak periods and are expected to be temporary in nature.

The additional traffic generated by the construction is minimal, resulting in marginal increases to approximately 963 pcu/h/l on Pembroke Road and 980 pcu/h/l on Ohaupo Road.

While road efficiency effects are expected to be less than minor, it is recommended that traffic conditions be monitored throughout the Project construction period. Intensive traffic generation activities carried out during the construction period should be optimised to avoid peak travel times.

7.3.2 Operational Phase

During operation, the reservoir is expected to generate up to eight vehicle trips per day for maintenance activities, typically involving operations and maintenance staff. Given the existing low traffic volumes, this small increase in traffic on Ruakiwi Road will have minimal impact on the surrounding road network.

Site Access 1 is proposed to be 10 m wide and is designed to allow for two opposing vehicle movements and to accommodate a 19.45m articulated HPMV during the construction period. This access will remain for operational and maintenance use during the operational phase; however, it will be formed to the ODP Rule 25.14.4.1 (h) – design and access width states that proposed second vehicle crossing shall:

(i) have a minimum width of 5.5m and a maximum width of 6.0m.
(ii) Be formed and drained with a permanent sealed or paved all weather, dust-free surface and in a manner suitable for the type and quantity of vehicles using the site.
(iii) Be designed and configured to meet the relevant requirements of Table 15-5ai and Table 15-6b in Appendix 15. Table 15-5ai recommends a minimum desirable legal width of 6.0m for a private way serving 7-20 residential units[2].

While routine maintenance will involve smaller vehicles, periodic heavy maintenance activities such as removal and replacement of pumps and pipes may require access for larger vehicles.

While the new access does not comply with the required intersection separation distance, it has been assessed and deemed acceptable based on site-specific factors, including low traffic volumes and minimal potential for conflict movements.

7.4 District Plan Rules

The Project has been assessed against the transport-related rules in the following guidelines:

- Regional Infrastructure Technical Specifications (RITS) dated May 2018,
- Hamilton City Council Operative District Plan (ODP), Chapter 25 - City Wide- Transportation and Appendix 15 – Transportation,
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.

7.4.1 Separation Distance

Site Access 1 is proposed approximately 18 m north of the Ruakiwi Road / Clarence Street intersection. It will primarily provide access to the site office for construction staff and visitors, which includes light vehicles and mini vans. The access will also accommodate 19.45m articulated HPMVs delivery trucks. The accessway will form a right-left staggered T-intersections with the existing Ruakiwi Road / Clarence Street intersection.

Site Access 2 is proposed approximately 80 m south of the Ruakiwi Road / Clarence Street intersection. The access will mainly be used by heavy delivery vehicles and can accommodate 11 m large rigid trucks. The accessway will form a T-intersection with Ruakiwi Road.

Ruakiwi Road has a posted speed limit of 50 km/h and a mean operating speed of 46 km/h based on MegaMaps.

Distance between Accessways

The ODP Rule 25.14.4.1 (a) – separation distances between vehicle crossings on the same transport corridor states that:

i. Where the posted speed of the adjoining road is 60km/h or less the distance between vehicle crossings on the same side of the road shall be either:
   A. Less than 2m (provided no more than 2 vehicle crossings adjoin each other); or
   B. More than 7.5m.

- Site Access 1 will have 2 m separation distance to the maintenance accessway for the existing and approximately 15 m to 16 Ruakiwi Road, and

[2] Transport corridors adjoining open space zone should reflect the land-use environment directly opposite these zones or be a continuation of the corridor either side. Site access controls may still vary.

- Site Access 2 will have approximately 10 m separation distance to 9/19 Ruakiwi Road and approximately 40 m to 19 Ruakiwi Road.

Both access points comply with the accessways separation distance requirements by the ODP.

Minimum Distance between any vehicle crossing and a transport corridor intersection

The ODP Rule 25.14.4.1 (c) – separation distances between vehicle crossings on the same transport corridor states that:

i. Minimum distance between any vehicle crossing and transport corridor intersection with a Minor Arterial adjoining transport corridor and a Local Road intersecting transport corridor– posted speed limit 60km/h or less shall be 30 m.

- The separation distance between Site Access 1 and the Ruakiwi Road / Clarence Street intersection will be approximately 18 m, and
- The separation distance between Site Access 2 and the Ruakiwi Road / Clarence Street intersection will be approximately 80 m.

Although Site Access 1 does not meet the minimum separation distance requirements between a vehicle crossing and intersection, a safety assessment of the intersection and proposed access location supported by historical crash data does not indicate any road safety concerns related to the reduced separation distances. There are clear sight lines between Site Access 1 and Clarence Street intersection. Additionally, the proposed access will operate under the site-specific traffic management plan (SSTMP) during the construction period. Operational phase has very low daily use and will not be used by the public, both of which together with the sight lines help to alleviate potential for adverse effects.

7.4.2 Sight Distance

The ODP Rule 25.14.4.1 (e) – sight distance from any vehicle crossings indicates:

- A minimum sight distance of 120 m for vehicle crossings on an arterial road with a 50km/h posted speed limit.

The access points were also checked against the truck stopping sight distance SSD requirements for trucks in Austroads, on a 60 km/h design speed and 2.0 seconds reaction time.

Table No: 10

Sight Distance							
Access	Sight Distance (HCC ODP)			SSD/ASD (AUSTROADS)			Compliance
	Direction	Required Distance (m)	Available Distance (m)	Approach	Required Distance (m)	Available Distance (m)	
Site Access 1	North	120	85	Northbound	82	82+	No
	South		120+	Southbound		82+	Yes
Site Access 2	North		120	Northbound		82+	Yes
	South		120+	Southbound		82+	Yes

Figure No: 17 and **Figure No: 18** shows the available sight lines to the north from Site Access 1 and 2 respectively. The achievable sight distance to the north from Site Access 1 is approximately 85 m which does not comply with the ODP requirements due to the existing horizontal curve in the road. Site Access 1 complies

with Austroads SSD requirements for both cars and trucks on sealed roads, based on a 60km/h operating speed and a 2.0 second reaction time.

It is recommended that advanced signage for the site accesses be implemented as part of the CTMP during the enabling and construction works, in combination with the temporary reduced speed limits, given the more frequent occurrence of those movements. Therefore, it is considered that the reduced sight distance is unlikely to compromise access safety.

Figure No: 17. Sightlines to the North from Site Access 1

Figure No: 18. Sightlines to the North from Site Access 2

7.4.3 Design and Access Width

The ODP Rule 25.14.4.1 (h) - Design and Access Widths indicates that:

h. Vehicle crossing and internal vehicle access for all other zones except residential shall have a minimum of 5.0 m width and a maximum of 7.5 m.

The minimum width for the proposed site accesses is 6.0 m at proposed Site Access 2 and the maximum access width is about 10 m at the proposed Site Access 1. The wider width at Site Access 1 is proposed to accommodate 19.45m articulated HPMV transporting large components during the construction phase. This access will be upgraded to meet the requirements of the ODP standards at the end of the construction period.

7.4.4 On-Site Manoeuvring and Loading

The ODP Rule 25.14.4.2 required that vehicle parking spaces, loading spaces, on-site drop off car spaces, and manoeuvring areas shall:

- Comply with the relevant dimensions, layouts and diagrams (including tracking curves) in Appendix 15-1 and are suitably designed for the vehicles and their occupants, and
- On-site manoeuvring area must be provided to avoid vehicles reversing from any car parking, loading space, or service area to any Arterial transport corridor.

On-site loading spaces and manoeuvring have been found to comply with the ODP requirements as described and shown in section 7.2. Sufficient manoeuvring area is available to avoid reverse movements on to the arterial road. The internal access road, laydown areas including parking shall be formed and drained with a permanent sealed or paved all weather, dust-free surface in a manner suitable for the type and quantity of vehicles using the site.

Should reversing to or from the site off Ruakiwi Road be required very occasionally, such as during the transport of plant or material to/from the site by vehicles larger than 19.45m HPMV, this would be managed under appropriate traffic management supervision by an Site Traffic Management Supervisor (STMS) with the necessary SSTMPs approved by HCC.

7.5 Road Safety – Vulnerable Road Users

There are no separate cycle facilities near the subject site and 1.5m wide footpaths exist on both sides of Ruakiwi Road for pedestrians. To mitigate the conflict between pedestrians and construction traffic at both access points, it is recommended to provide clearly marked, barrier-protected pedestrian paths around the construction zone. Clear, visible wayfinding signage should be used to guide pedestrians safely around the site accesses.

HCVs pose a greater risk to road users, particularly when traveling with downhill momentum. There will be increased exposure to HCV movements on Ruakiwi Road. Road users such as cyclists, pedestrians, and motorcyclists are particularly vulnerable. A CTMP will highlight the increased presence of HCVs to road users. Adherence to this CTMP will be sufficient to address safety concerns associated with increased HCV volumes.

7.6 On-Street Parking along Ruakiwi Road

Parallel on-street parking is provided on both sides of Ruakiwi Road, south of Clarence Street. This parking primarily serves commuters employed in the central business district and visitors to adjacent properties. It is noted that residents of the neighbouring properties are generally accommodated by dedicated off-street parking facilities.

To facilitate the safe operations at Site Access 2, approximately six parking spaces on the western side of Ruakiwi Road will have to be temporarily removed, refer to **Figure No: 19** below.

Figure No: 19. Parking Spaces temporarily affected due to Site Access 2

According to HCC Parking Policy (March 2024), parking on Ruakiwi Road and surrounding road network is primarily designated as long-stay or commuter parking, which is ranked at priority 7, the lowest level of kerbside management. In this context, ensuring safe and efficient access to the construction site is considered a key priority.

The traffic effects of removing the six on-street parking spaces are considered minor to negligible for the following reasons:

- Adjacent streets and nearby on-street facilities provide sufficient flexibility to accommodate displaced long-stay or commuter parking.
- The parking removal is temporary; and will be reinstated at the end of the construction phase.
- Safe and efficient site access will be maintained during the construction period which aligns with the HCC parking policy prioritisation framework.

7.7 Construction Traffic Management Plan (CTMP)

The construction of the proposed reservoirs will vary the normal operating conditions of the adjoining road network and therefore a CTMP will be required under the Code of Practice for Temporary Traffic Management ("CoPTTM"). The requirement for a CTMP will allow potential adverse effects on the adjoining road network to be appropriately managed. It is recommended that the objectives outlined below are

incorporated into the relevant conditions for the CTMP, should consent be approved, to guide its further development by the Contractor (once appointed):

- Manage the number of construction traffic movements on the transport network.
- Provide for the safety of everyone at all times.
- Ensure of maintenance of access at all times to / from properties.
- Minimise disruption from construction traffic on the travelling public and road users along the identified sections of the construction routes.
- Seek to avoid full road closures and minimise any partial or managed closures.
- Manage integration with other construction projects and HCC Transport projects.
- Provide for prior engagement with relevant stakeholders, when public access, particularly to properties will be affected by construction traffic.
- Provide a mechanism for addressing queries and responding to complaints.

The CTMP should specifically include but not be limited to:

- Purpose and objectives of the CTMP.
- Specific details of the construction programme and predicted trip generation.
- Traffic demand management – minimisation of traffic generation, and scheduling to minimise effects on the road network.
- Monitoring of construction traffic in and out of the accesses to determine if any issues materialise as a result of the Project. This could involve unexpected safety concerns or congestion, potentially during the peak periods. The mitigation measures could include scheduling delivery vehicle movements during off-peak hours, increasing signage, or improving traffic control at the access point when specific issues arise.
- Detailed route planning including all suppliers, use of adjoining road network. Establishing safe and efficient travel routes and site accesses.
- Nature and timing of any road improvement works required. Physical works will be undertaken proactively prior to the relevant activity commencing.
- Road safety including minimising effects on existing activities.
- Providing clear and visible wayfinding signage along the footpath on the western side of Ruakiwi Road, particularly at locations where pedestrians and cyclists will be crossing the site access points. These signs should guide pedestrians safely around the construction access areas, indicating caution zones, and safe crossing points. Signage should be compliant with relevant accessibility and safety standards, ensuring visibility for all users.
- Temporary Traffic Management including any specific plans related to each phase and activity of the works including signage.
- Operational requirements including driver behaviour, compliance and education.
- Communication with stakeholders including relevant Road Authorities, Emergency Services, the community and road users generally.
- Planning for, and details of overweight / over-dimension transport movements, including any relevant permit provisions.
- Incident reporting mechanisms, recording and reporting methods.
- Contingency planning and response provisions.

The measures set out above are expected to minimise the effect of construction vehicle movements on the surrounding road network and support the safe and efficient delivery of equipment to the site. It is considered that through the implementation of the CTMP, the temporary effects of the construction activities on the local road network can be adequately managed.

The CTMP should be prepared by a suitably experienced and qualified transport engineer in consultation with Hamilton City Council and Waka Kotahi NZTA.

8. Conclusions

The overall transportation effects of the adjoining road network during the construction of the proposed Reservoirs are expected to be minor if no transport mitigation measures are implemented.

However, with the recommended mitigation measures, the transportation effects during the construction phase can be sufficiently mitigated to an acceptable and appropriate level. The following conclusions can be made based on the assessments detailed in this report:

Traffic Generation

- The proposal is likely to generate 14 vehicle movements per day with peaks up to around 80 vehicle movements per day for 2-5 days per month over a duration of about 30 months (i.e. approximately 620 working days) per reservoir construction. The days on which a pour is taking place could generate up to 16 heavy vehicle movements per hour, though this intensity will be for one day.
- The assessment indicates that the increase in traffic volumes during the construction phase can be accommodated by the adjoining local road network. However, a CTMP should be provided to HCC for review and certification prior to physical work commencing on site, to ensure safe and appropriate (for construction traffic types and volume) temporary traffic management measures are implemented at the site accesses and on affected roads, particularly during phases of regular heavy vehicle movements.
- Trip generation during operational phase is expected to be negligible.

Site Access and Safety

- The subject site will be served by two accesses during the construction of Reservoir 1. Site Access 1 is strategically located approximately 18 meters north of the Ruakiwi Road / Clarence Street intersection. While it does not meet the ODP requirements for accessway–intersection separation, safety assessments and historical crash data near the access location does not indicate any safety concerns. The site will have clear sight lines between Site Access 1 and the intersection.

  The access will accommodate a range of vehicles, including light vehicles, mini vans, and 19.45m articulated HPMV delivery trucks.

- Site Access 2 will be located approximately 80m south of Ruakiwi Road / Clarence Street. The access will meet all the ODP requirements for accessway–intersection separation, and sigh lines. The access will accommodate a range of vehicles, including light vehicles, mini vans, and 11m large rigid delivery trucks.

Vehicle Tracking

- Vehicle tracking analysis confirms that a 10-meter-wide access at Site Access 1 is sufficient to safely accommodate 19.45-meter articulated HPMVs, supporting the delivery of large precast panels and pipes. If a larger vehicle is used for transportation, a separate vehicle tracking will be required, and a special permit may be necessary.

- Similarly, Site Access 2 is designed to accommodate up to a 11-metre rigid truck, with a 6.0-meter-wide accessway and sufficient on-site manoeuvring space. Temporary impacts include the loss of approximately six on-street parking spaces on the western side of Ruakiwi Road to facilitate safe vehicle movements at Site Access 2.

Oversized and Over-dimensioned Route

- A key aspect of the Project is the transportation of large wall panels and pipe components, large items of equipment and plant into the site as overweight and over-dimension loads. The preferred route for these loads between the designated OW-OD routes and the Project site is the southern route from the SH1C to the subject site.

On-Street Parking

Approximately six parking spaces on the western side of Ruakiwi Road will need to be temporarily removed to accommodate Site Access 2 during Reservoir 1 construction. This reduction in parking supply is considered minimal, as sufficient on-street parking will remain to accommodate visitors in the surrounding area. During Stage 2 construction phase, access will be limited to Site Access 1 which has no impact on-street parking.

Other Modes

Pedestrian movements along the western footpath of Ruakiwi Road will require safe and clearly defined crossing points at each site access location. Appropriate pedestrian safety measures, such as marked crossings, signage, and temporary traffic controls, needs to be implemented to ensure continuous and secure pedestrian connectivity throughout the construction period.

9. Recommendations

Based on the conclusions of this report, there are no traffic or transportation effects related reasons why the proposed reservoirs should not be approved, provided the following recommended mitigation measures are implemented through Resource Consent conditions:

Proposed Site Accesses to Project Site

All new vehicle site accesses be constructed based on detailed vehicle tracking for each location during the construction phase and be surfaced to the ODP standards.

The remaining access for operations and maintenance should be formed in line with the ODP access design standards.

Preparation of Construction Traffic Management Plan

A CTMP is to be developed and submitted to Hamilton City Council's Planning Guidance Unit Director or nominee for review and acceptance before physical works commences on site. The CTMP should include but not be limited to the content listed in Section 7.7 of this TA report. The CTMP should include all approved temporary traffic management plans necessary for each of the construction phases to ensure the ongoing safe operation of the adjoining road network and its users, including vulnerable road users (pedestrians, mobility impaired and cyclists).

Appendix A – Crash Data History

CODED CRASH ID	Crash road	Distance	Direction	Side road	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Casualty count fatal	Casualty count serious	Casualty count minor	Social Cost $(m)
1244600	PEMBROKE STREET		I	RUAKIWI ROAD	2020159626	27/07/2020	Mon	11:00	Car/Wagon1 SDB on PEMBROKE STREET hit rear end of Car/Wagon2 stop/slow for signals	CAR/WAGON1, attn diverted by scenery/persons outside vehicle, following too closely	Dry	Overcast	Fine	T Junction	Traffic Signals	0	0	0	0.05
1426206	PEMBROKE STREET		I	RUAKIWI ROAD	2025320357	5/02/2025	Wed	8:40	Motorcycle1 NDB on PEMBROKE STREET hit Car/Wagon2 merging from the left	CAR/WAGON2, failed to give way at priority traffic control	Dry	Bright sun	Fine	T Junction	Give way	0	0	1	
1323916	PEMBROKE STREET		I	RUAKIWI ROAD	2022223215	20/05/2022	Fri	14:55	Car/Wagon1 SDB on PEMBROKE STREET hit Car/Wagon2 merging from the right	CAR/WAGON1, alcohol test below limit CAR/WAGON2, did not check/notice another party from other dirn, failed to give way at priority traffic control, new driver/under instruction	Wet	Bright sun	Fine	T Junction	Give way	0	0	0	0.05
1347367	PEMBROKE STREET		I	RUAKIWI ROAD	2023257860	30/05/2023	Tue	20:58	Car/Wagon1 NDB on PEMBROKE STREET hit Bus2 headon on straight, Car/Wagon1 hit bus at bus stop	CAR/WAGON3, alcohol test below limit CAR/WAGON1, alcohol suspected, drugs suspected, evading enforcement, speed on straight, vehicle crossing flush median	Wet	Dark	Fine	T Junction	Nil	0	2	0	1.04
1282910	PEMBROKE STREET		I	RUAKIWI ROAD	2021187559	11/05/2021	Tue	16:02	Car/Wagon1 NDB on PEMBROKE STREET lost control; went off road to right, Car/Wagon1 hit pole, traffic island, kerb,	CAR/WAGON1, alcohol test below limit, sudden illness, too far right	Dry	Overcast	Light rain	T Junction	Give way	0	0	0	0.05
1241477	ROTOROA DRIVE		I	RUAKIWI ROAD	2020162051	12/08/2020	Wed	8:50	SUV1 SDB on RUAKIWI ROAD, HAMILTON LAKE, HAMILTON turning right hit Wheeled pedestrian (wheelchairs, mobility scooters, etc) 2 (Age 12) crossing SIDEROAD from right	SUV1, alcohol test below limit, WHEELED PEDESTRIAN (WHEELCHAIRS, MOBILITY SCOOTERS2, other pedestrian crossing road	Dry	Overcast	Fine	T Junction	Give way	0	0	1	0.31
1350720	RUAKIWI ROAD	114	N	CLARENCE STREET	2023260126	23/06/2023	Fri	6:38	Car/Wagon1 NDB on RUAKIWI ROAD lost control; went off road to left, Car/Wagon1 hit tree	CAR/WAGON1, alcohol test below limit, fatigue due to lack of sleep, lost control - road conditions, mixed treads/space savers, speed on straight, ENV: slippery road due to rain	Wet	Dark	Light rain	Nil (Default)	Nil	0	0	2	0.31
1232442	RUAKIWI ROAD	50	S	CLARENCE STREET	2020148730	12/03/2020	Thu	18:00	Ute1 NDB on RUAKIWI ROAD hit rear end of Car/Wagon2 stopped/moving slowly	CAR/WAGON2, alcohol test below limit, emotionally upset/road rage, speed on straight UTE1, emotionally upset/road rage, intentional collision, speed on straight	Dry	Bright sun	Fine	Nil (Default)	Nil	0	0	0	0.05
1249500	RUAKIWI ROAD	71	S	CLARENCE STREET	2020173181	16/12/2020	Wed	8:35	SUV1 SDB on RUAKIWI ROAD hit Car/Wagon2 U-turning from opposite direction of travel , Car/Wagon2 hit hedge, parked (unattended) vehicle	SUV1, alcohol test below limit CAR/WAGON2, alcohol test below limit, did not check/notice another party from other dirn	Dry	Bright sun	Fine	Driveway	Nil	0	0	1	0.31
1389049	RUAKIWI ROAD	53	N	CLARENCE STREET	2023273351	18/11/2023	Sat	22:45	Car/Wagon1 SDB on RUAKIWI ROAD lost control turning left; went off road to left, Car/Wagon1 hit parked (unattended) vehicle	CAR/WAGON1, alcohol test below limit, attention diverted by cell phone, new driver/under instruction, too far left	Wet	Dark	Light rain	Nil (Default)	Nil	0	0	0	0.05
1230045	RUAKIWI ROAD	55	S	COLLINGWOOD STREET	2020145023	4/02/2020	Tue	17:25	Car/Wagon1 EDB on Ruakiwi hit rear end of Car/Wagon2 stopped/moving slowly	CAR/WAGON1, alcohol test below limit, following too closely CAR/WAGON2, alcohol test below limit, sudden action	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0	0.05
1368214	RUAKIWI ROAD		I	COLLINGWOOD STREET	2023257361	22/05/2023	Mon	16:00	Car/Wagon1 SDB on RUAKIWI ROAD lost control turning left; went off road to right	CAR/WAGON1, alcohol test below limit, lost control when turning BUS2, alcohol test below limit	Wet	Overcast	Light rain	T Junction	Stop	0	0	0	0.05

CODED CRASH ID	Crash road	Distance	Direction	Side road	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Casualty count fatal	Casualty count serious	Casualty count minor	Social Cost $(m)
1347793	RUAKIWI ROAD		I	COLLINGWOOD STREET	2022239285	30/10/2022	Sun	13:45	Van1 SDB on RUAKIWI ROAD lost control turning left; went off road to right, Van1 hit stationary (attended) vehicle	VAN1, lost control - road conditions, ENV: heavy rain, slippery road due to rain	Wet	Overcast	Heavy rain	T Junction	Stop	0	0	0	0.05
1228623	RUAKIWI ROAD	37	W	HILL STREET	2020151218	14/01/2020	Tue	19:20	Left scene1 WDB on RUAKIWI ROAD hit parked veh, Left scene1 hit parked (unattended) vehicle	LEFT SCENE1, too far left	Dry	Overcast	Fine	Nil (Default)	Nil	0	0	0	0.05
1419193	RUAKIWI ROAD		I	HILL STREET	2022299389	24/12/2022	Sat	21:00	Car/Wagon1 WDB on RUAKIWI ROAD lost control turning left; went off road to right	CAR/WAGON1, swerved to avoid animal, ENV: household pet rushed out or playing	Dry	Dark	Fine	T Junction	Give way	0	0	0	0.05
1243063	RUAKIWI ROAD		I	HILL STREET	2020163749	9/09/2020	Wed	7:55	Cycle1 EDB on RUAKIWI ROAD hit Left scene2 turning right onto AXROAD from the left	CYCLE1, alcohol test below limit LEFT SCENE2, failed to give way at priority traffic control	Dry	Bright sun	Fine	T Junction	Give way	0	0	1	0.31
1234743	RUAKIWI ROAD		I	PEMBROKE STREET	2020151113	24/04/2020	Fri	18:30	Car/Wagon1 SDB on Pembroke Street lost control turning right; went off road to left, Car/Wagon1 hit light pole	CAR/WAGON1, evading enforcement, headlights fail suddenly, inadequate/no headlights, lost control when turning, speed entering corner/curve	Dry	Dark	Fine	T Junction	Give way	0	0	0	0.05
1244577	RUAKIWI ROAD		I	PEMBROKE STREET	2020159775	27/07/2020	Mon	10:32	Car/Wagon1 EDB on RUAKIWI ROAD hit rear end of Car/Wagon2 stop/slow for cross traffic	CAR/WAGON2, alcohol test below limit CAR/WAGON1, alcohol test below limit, failed to notice car slowing, stopping/stationary	Dry	Bright sun	Fine	T Junction	Give way	0	0	0	0.05
1389776	RUAKIWI ROAD		I	PEMBROKE STREET	2023273270	1/11/2023	Wed	8:53	Unknown1 EDB on RUAKIWI ROAD hit rear end of Car/Wagon2 stop/slow for cross traffic	CAR/WAGON2, alcohol test below limit UNKNOWN1, following too closely	Dry	Bright sun	Fine	T Junction	Give way	0	0	0	0.05
1284343	RUAKIWI ROAD	48	N	ROTOROA DRIVE	2021189947	20/05/2021	Thu	10:45	Car/Wagon1 NDB on RUAKIWI ROAD hit Car/Wagon2 U-turning from same direction of travel	CAR/WAGON1, alcohol test below limit, misjudged intentions of another party, overtaking vehicle signalling right turn CAR/WAGON2, alcohol test above limit or test refused, did not check/notice another party from other dirn	Dry	Overcast	Fine	Nil (Default)	Nil	0	0	0	0.05
1256758	RUAKIWI ROAD	21	S	THACKERAY STREET	2021183922	25/02/2021	Thu	17:15	Car/Wagon1 SDB on Ruakiwi Road hit parked veh, Car/Wagon1 hit parked (unattended) vehicle	CAR/WAGON1, new driver/under instruction, too far left	Dry	Bright sun	Fine	Nil (Default)	Nil	0	0	1	0.31
1413392	RUAKIWI ROAD	32	N	THACKERAY STREET	2024286418	4/05/2024	Sat	2:10	Car/Wagon1 SDB on RUAKIWI ROAD lost control turning right; went off road to left, Car/Wagon1 hit traffic sign, substantial vegetation (causing vehicle damage or stopping the vehicle)	CAR/WAGON1, alcohol test below limit, other lost control	Dry	Dark	Fine	Nil (Default)	Nil	0	0	0	0.05
1353525	RUAKIWI ROAD	74	S	THACKERAY STREET	2022244431	15/12/2022	Thu	7:01	Car/Wagon1 SDB on RUAKIWI ROAD lost control turning left; went off road to left, Car/Wagon1 hit light pole	CAR/WAGON1, alcohol test below limit, lost control when turning, ENV: heavy rain, slippery road due to rain	Wet	Overcast	Heavy rain	Nil (Default)	Nil	0	0	0	0.05
1369368	RUAKIWI ROAD		I	THACKERAY STREET	2023258226	3/06/2023	Sat	14:02	Car/Wagon1 SDB on RUAKIWI ROAD lost control turning right; went off road to left, Car/Wagon1 hit power pole	CAR/WAGON1, alcohol test below limit, too far left	Dry	Bright sun	Fine	T Junction	Give way	0	0	0	0.05

Appendix B – Vehicle Tracking Analysis

DESIGN VEHICLE 1

AT-HMPV Semi 19.45 (Rear Steer)

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 24.1
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

KEY:NAME

- FRONT TIRES
- REAR TIRES
- VEHICLE BODY
- VEHICLE BODY ENVELOPE

1:1000 (A3) 0 20 40 60m

DRAFT COPY NOT APPROVED

DRAWING ISSUE							
REV	DATE	DESCRIPTION	REV BY	CHK	APPR		
A	16.06.2025	CONCEPT LAYOUT	TM	SKB	CI		

DESIGNED TM
DRAWN TM
CHECKED SKB
APPROVED CI

CLIENT: Hamilton City Council, Te kaunihera o Kirikiriroa

PROJECT: CENTRAL CITY RESERVOIR - HAMILTON

DRAWING: PROPOSED SITE ACCESS 1 CONCEPT DESIGN - 19.45m HPMV VEHICLE TRACKING ANALYSIS & ON-SITE MANOEUVRING

STATUS: PRELIMINARY

HORIZONTAL DATUM	NZTM2000	SCALE (A3) 1:1000
VERTICAL DATUM	NZVD16	
DRAWING NUMBER	149000-06-0021	REVISION -

Version 5.0 - August 2024

100mm

SCALE FOR VALIDATING SIZE OF A3 PLOT ONLY

0

C:\1260\data\10.7.120.14\149000.06 - HCC Central City Reservoir_ 5575\03 Drawing\06\149000-06-0022.dwg 24/6/2025 3:18 pm tmairiti Plotted: 24 Jun 2025 3:18 pm

DRAWING ISSUE						
REV	DATE	DESCRIPTION	REV BY	CHK	APPR	
A	16.06.2025	CONCEPT LAYOUT	TM	SKB	CI	

DESIGNED TM
DRAWN TM
CHECKED SKB
APPROVED CI

Version 5.0 - August 2024

CLIENT: Hamilton City Council, Te kaunihera o Kirikiriroa

PROJECT: CENTRAL CITY RESERVOIR - HAMILTON

DRAWING: PROPOSED SITE ACCESS 2 CONCEPT DESIGN - 11m LARGE RIGID TRUCK TRACKING ANALYSIS & ON-SITE MANOEUVRING
THE PROJECT AREA

DRAFT COPY NOT APPROVED

STATUS: PRELIMINARY

HORIZONTAL DATUM	NZTM2000	SCALE (A3) 1:1000
VERTICAL DATUM	NZVD16	
DRAWING NUMBER	149000-06-0022	REVISION -

Appendix C – Designation Plans

ROTOROA DRIVE

RUAKIWI ROAD

CLARENCE STREET

RUAKIWI ROAD

Stage 2

reservoir (2)

reservoir (1)

Stage 1, see P30-02

- Proposed Reservoirs
- Designation A67 Water Reservoir (Ruakiwi Road)
- Significant Natural Area (SNA)
- Laydown Area stage 1 (proposed)
- Laydown Area stage 2 (proposed)
- Valve Chamber (proposed)
- Existing Legal Boundaries
- Protected Tree & 26m Root Protection Zone T280.26
- New Designation area (proposed final)
- SW Stormwater and clean water scour pipe (proposed - public)

All dimensions to be verified on site before making any shop drawings or commencing any work

Rev	Date	Appd	Reason
C	29/04/2025	CL	Updated for Designation Purposes

Consultants

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CENTRAL CITY
RESERVOIR
HAMILTON

Sheet Title: designation plan

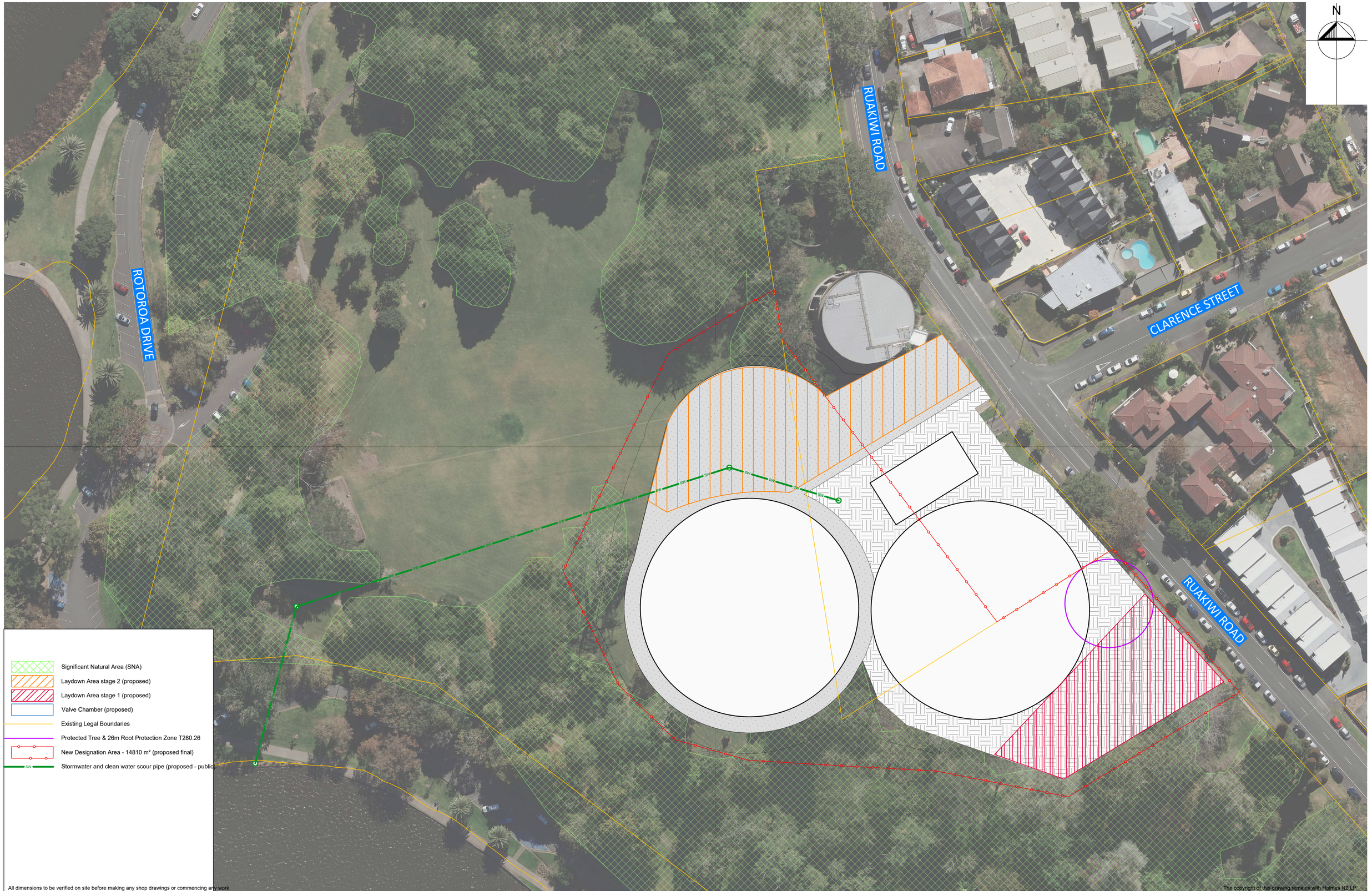
Drawn JMR | Scale 1:500 (at A1)

Filename 148023.33 P-Designation plan.dwg

Job No | Sheet No | Rev

148023.33 P30-01 | C

File: \\akl-filer-01.all.offices.holmesgroup.com\HCG\CAD\148023.33\Civil 3D\148023.33 P-Designation Plan.dwg Date Plotted: 29/04/2025 1:15:21 pm By: Johan Rosendo



All dimensions to be verified on site before making any shop drawings or commencing any work

Rev	Date	Appd	Reason
C	29/04/2025	CL	Updated for Designation Purposes

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CENTRAL CITY
RESERVOIR
HAMILTON

Sheet Title
designation areas plan view

Drawn JMR Scale 1:500 (at A1)
Filename 148023.33 P-Designation plan.dwg
Job No 148023.33 Sheet No P30-02 Rev C

File: \\akl-filer-01.all.offices.holmesgroup.com\HCG\CAD\148023.33\Civil 3D\148023.33 P-Designation Plan.dwg Date Plotted: 29/04/2025 1:23:56 pm By: Johan Rosendo

N

legend:

- Proposed Reservoirs
- Designation A67 Water Reservoir (Ruakiwi Road)
- Valve Chamber (proposed)
- Existing Legal Boundaries
- New Designation area (proposed final)
- SW — Stormwater and clean water scour pipe (proposed - public)

Description of Macroscope

The proposal is for completion of the Stage 1 Central City Reservoir to be located at 18 Ruakiwi Road, south of the existing Ruakiwi Road Reservoir. A pump station will also be required located at 139 Clarence Street, with infrastructure connecting the two sites to operate efficiently. The works are consistent with the scope included within the Infrastructure Acceleration Fund bid submission and agreed upon with Kāinga Ora.

The proposal provides for construction of:

a) **Reservoir:** 2x25 megalitres water reservoir to be located at 18 Ruakiwi Road, south of the existing Ruakiwi Road Reservoir.
b) **Valve chamber:** 430m2 valve chamber located at the site, between the IAF reservoir and future reservoir, to support the operation of the reservoirs.
c) **Ancillary pipelines:** includes clean water scour discharge pipeline to Lake Rotoroa and connections to public three water systems from the site.
d) **Booster pump station:** A booster pump station to be located at 139 Clarence Street on land already purchased by Council for the project.

Notice of Requirement is programmed to be lodged mid 2025 to secure a designation on the site. Procurement for physical works is programmed to commence in mid to late 2025 via early contractor involvement. Construction starting mid 2026. Completion of works is expected January 2029 aligning with the Kainga Ora agreement.

Opportunities/Threats:

Opportunities:
Cultural Connections:
Tangata Whenua are involved in project planning and opportunities for cultural symbolism to be incorporated within the works.
Pedestrian Linkage:
Pedestrian linkages from Ruakiwi Road to the lake can be readily accommodated within the project to provide improved access from this site to the lake.
Future Proofing:
Designating both reservoirs provides the forward thinking to allow the second reservoir a simpler progression from concept to construction.

Threats:
Programme:
Under the Infrastructure Acceleration Fund agreement Council must complete the construction of this reservoir by January 2029 or there is a risk to the funding. In order to achieve this programme a minimal amount of delays are able to be absorbed by the programme.

Rev	Date	Appd	Reason
B	29/04/2025	CL	Updated for Designation Purposes

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CENTRAL CITY
RESERVOIR
HAMILTON

Sheet Title: designation key plan

Drawn: JMR | Scale: 1:1000 (at A1)
Filename: 148023.33 P-Designation plan.dwg
Job No: 148023.33 | Sheet No: P30-03 | Rev: B

File: \\akl-filer-01.all.offices.holmesgroup.com\HCG\CAD\148023.33\Civil 3D\148023.33 P-Designation Plan.dwg Date Plotted: 29/04/2025 1:12:19 pm By: Johan Rosendo