Project Number: 3-WW021.02

Eastern Hills Reservoir

Construction Methodology

14 FEBRUARY 2024

CONFIDENTIAL

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150 YEARS IN AOTEAROA

EASTERN HILLS RESERVOIR
Pipe Alignment Assessment

Wellington Water

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REV	DATE	DETAILS
1	11/10/23	For external legal review
2	14/02/24	Issued to Wellington Water

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Contents

1 Introduction

1.1 The Project

A new 15ML reservoir called “Eastern Hills Reservoir” is required to allow for population growth and security of water supply in Hutt City. The reservoir is to be located adjacent to the existing Naenae reservoir at the top of Summit Road.

During design development for the Eastern Hills Reservoir project, two contractors were provided design information and asked to provide their construction methodologies. This was used to make amendments to the preliminary design with the aim of making the design more easily constructible and to lessen the expected environmental effects, as far as reasonably practicable.

1.2 Purpose

The purpose of this report is to describe an indicative philosophy for the staging and sequencing for the Eastern Hills construction. This is based upon general assumptions derived from construction methodologies received from prospective contractors, HEB and Fulton Hogan, in May 2023.

The draft Construction Methodology provides a methodology and framework of management plans and protocols to be used during the Project’s construction phase for implementing, managing and monitoring the environmental controls specified in relevant consent conditions.

A final Construction Methodology will be developed by the successful Contractor to suit their specific methodologies and outline all details required to construct the Project with the least adverse environmental effects.

A general overview of the proposed construction programme and methods that may be adopted during construction is provided in this report. At the time of reporting, the method of procurement for this project is Design and Construction (D&C). This indicative methodology provides options for construction but requires some flexibility to be retained to allow innovation to be applied during detailed design and construction.

This report should be read in conjunction with the Draft Erosion and Sediment Control Plan, which provides a detailed methodology for the environmental controls that this report outlines.

2 Construction Objectives

The objective of the construction phase is to deliver a high-quality product, in the most cost effective, timely and efficient manner with zero harm to people involved. The construction phase will comply with all conditions and manage the effects on the surrounding environment, road users and the local and wider community.

To achieve this objective, the construction methodology notes the following key features:

- Sequencing of construction to optimise cut/fill earthworks balance and the effective reuse of undercut material, in order to minimise offsite disposal and the requirement for imported material from local quarries.
- The earthworks sequencing is a critical element in the construction methodology as this can significantly impact the overall duration of the Project and has major programme and cost implications due to the restriction of 'winter works' by the Greater Wellington Regional Council and the timing of environmental controls such as lizard salvage. There are also constraints driven by locality and availability of suitable materials and disposal of unsuitable materials.
- Selection of aggregate sources to reduce disruption from construction traffic on local roads while maintaining cost effectiveness.
- Traffic management and construction sequencing arrangements that are safe, timely and result in minimal disruption to all users, including pedestrians, cyclists, and public and construction vehicles.
- Appropriate use of erosion and sediment control measures and timing of works during drier periods to manage earthworks and impacts on Waiwhetū Stream.

3 Scope of Works

The work scope of the project for the construction phase is:

- Construction of a 15ML circular, concrete reservoir with associated concrete valve house;
- Installation of approximately 100m of DN750 inlet pipe;
- Installation of approximately 200m of DN750 delivery/outlet pipe;
- Installation of approximately 200m of DN500 scour/overflow pipe;
- Outfall to Waiwhetū Stream with an energy dissipation structure;
- Below-ground stream crossing across Waiwhetū Stream for the delivery pipe;
- Installation of approximately 100m of DN500 delivery pipe connecting Naenae reservoir to the new reservoir;
- Installation of approximately 50m of DN300 scour/overflow pipe from Naenae reservoir to the scour/overflow pipe from the new reservoir;
- Connection to bulk network at Balgownie Grove.
- Bulk earthworks on the site to facilitate construction of the reservoir;
- Reinstatement of a fire-break and access track around the reservoir site;
- Landscaping and planting.

Refer to Figure 1 for a site layout plan.

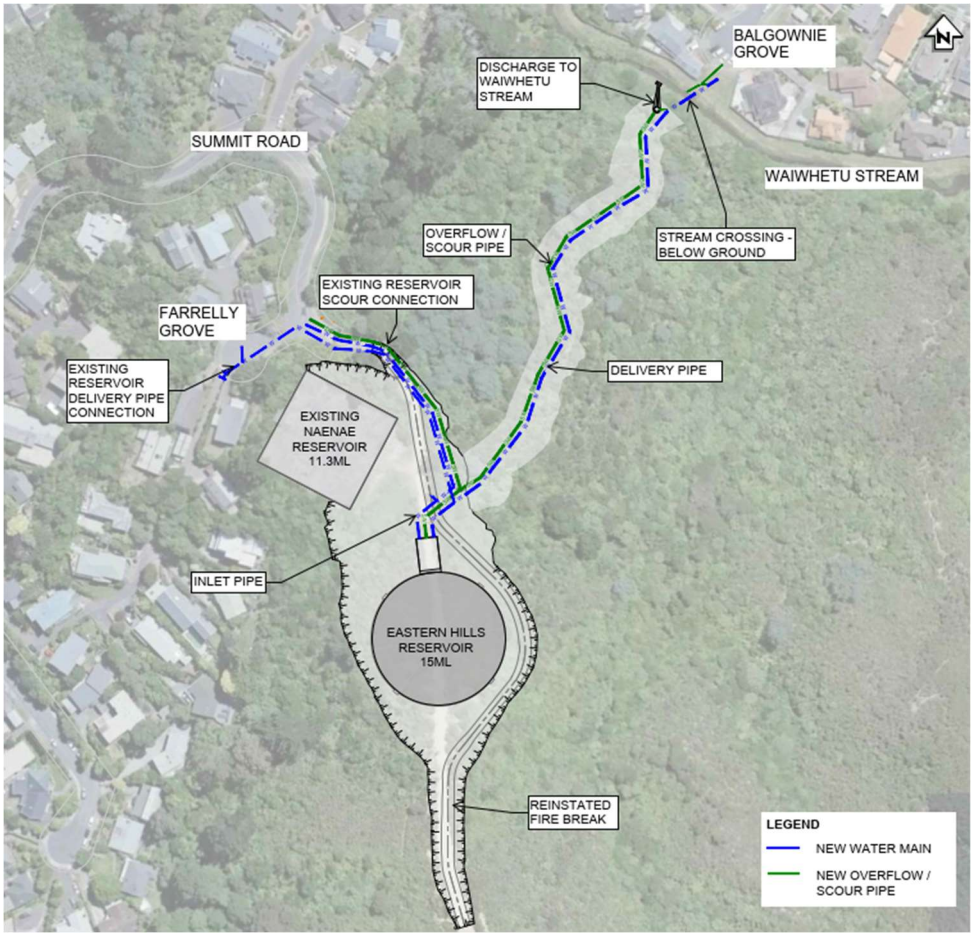


Figure 1. Site Layout Plan

4 Proposed Construction Sequence

An indicative construction sequence is expected to follow:

1 Set up of site, environmental controls and access road preparation.
2 Bulk earthworks and enabling works for the reservoir.
3 Subgrade works at the reservoir and valvehouse footprints.
4 Reservoir and valvehouse construction.
5 Earthworks and enabling works for the delivery/scour pipelines.
6 Install scour and delivery pipes, including Waiwhetū stream discharge and crossing.
7 Valvehouse fitout.
8 Reservoir testing and commissioning.
9 Landscaping, site finishing works and decommissioning of temporary erosion/sediment control measures.

Both prospective contractors proposed that the delivery and scour pipes are installed in parallel with bulk earthworks for the reservoir i.e., during the same earthworks season[1]. However, Connect Water note that there is restricted working space on the site, and it is not feasible based on the current design. Therefore, for consenting purposes we have conservatively assumed the vegetation clearance and earthworks for the reservoir and pipelines occur over two different earthworks seasons.

Full indicative construction programme is shown in Figure 2 and included in Appendix A.

Task Name	Duration	Start
Eastern Hills Reservoir Construction Programme	**796.75 days**	**Fri 15/03/24**
Contract Award	0 days	Mon 1/04/24
Detailed design development from 30% to IFC	90 days	Tue 2/04/24
Early drafting of Mgmt Plans prior to consent approval	15 days	Fri 15/03/24
Mgmt Plans & Permits, including review and approval	85 days	Mon 1/04/24
Start on site	0 days	Tue 9/07/24
Site Establishment	**67.75 days**	**Tue 9/07/24**
Establishment - fencing, site offices and compound	9 days	Tue 9/07/24
Rehousing lizards - reservoir area	10 days	Mon 2/09/24
Vegetation clearance - Reservoir and working platform	15 days	Sat 7/09/24
Erosion and sediment control measures	15 days	Sat 7/09/24
Earthworks for Reservoir	**220 days**	**Tue 24/09/24**
Cut to waste off-site - 100,000m3	220 days	Tue 24/09/24
Cut slope and eastern batter stabilisation	120 days	Sat 9/11/24
Enabling works for Pipelines	**20 days**	**Mon 1/09/25**
Rehousing lizards for pipeline works	10 days	Mon 1/09/25
Vegetation clearance - pipeline	10 days	Thu 11/09/25
Install scour and delivery pipeline	**130 days**	**Tue 23/09/25**
Cut to waste off-site - 8,400m3	105 days	Tue 23/09/25
Scour and delivery pipe install and connection	105 days	Tue 23/09/25
Stream outfall and stream crossing (with sheet piling)	40 days	Thu 15/01/26
Cross-connections between Naenae and Proposed Reserv	50 days	Wed 26/11/25
Reservoir Construction	**370 days**	**Wed 25/06/25**
Ground improvements - piling and capping beam	30 days	Wed 25/06/25
Reservoir substructure and base slab	75 days	Tue 29/07/25
Reservoir walls and columns	65 days	Wed 22/10/25
Reservoir beams and roof	85 days	Fri 16/01/26
Reservoir waterproofing	25 days	Thu 30/04/26
Reservoir structure complete	0 days	Fri 29/05/26
Reservoir leak test	30 days	Fri 29/05/26
Reservoir testing and commissioning	60 days	Sat 4/07/26
Valvehouse Construction	**305 days**	**Wed 25/06/25**
Valve house - stage 1 (below ground level)	25 days	Wed 25/06/25
Valve house - stage 2 and mech install	20 days	Thu 30/04/26
Electrical, ventilation install in valve house	30 days	Sat 23/05/26
Landscaping and Reinstatement	**85 days**	**Fri 29/05/26**
Cut to waste off-site - 6,000m3	15 days	Fri 29/05/26
Reinstatement of fire-break track	30 days	Thu 18/06/26
Planting and landscaping	40 days	Wed 22/07/26
Contractor's float	40 days	Fri 11/09/26
Project complete	0 days	Wed 28/10/26

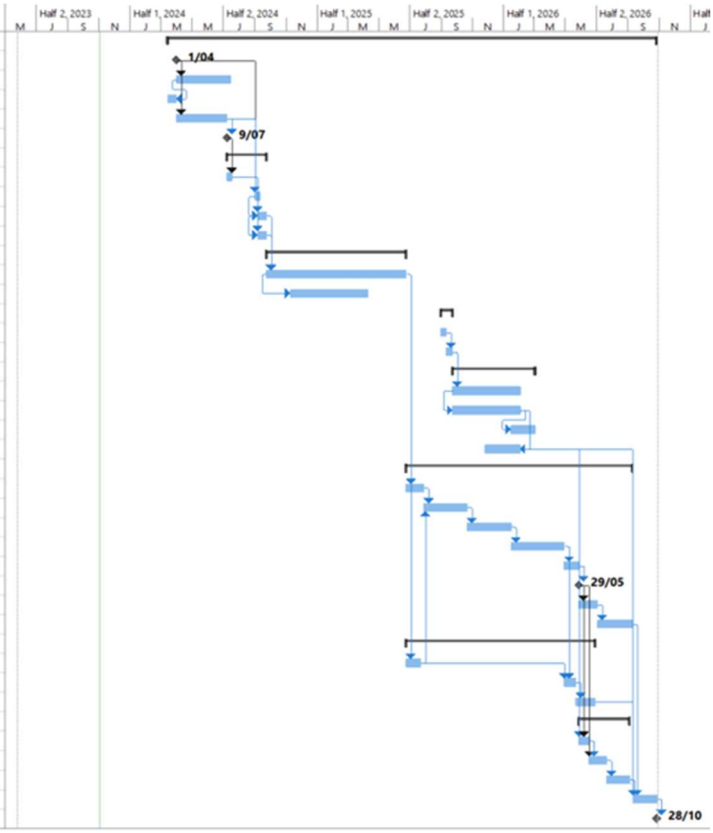


Figure 2. Indicative construction programme

[1] Earthworks season defined as 1st October to 31st May (based on GWRC definition of 'winter works' season as 1st June to 30th September)

5 Construction Methodology

5.1 Site Establishment

Access to site is via Summit Road which is a moderately steep, winding and narrow residential street. There are no overhead lines up Summit Road, but some vegetation may need to be trimmed to allow the passage of high loads.

There is likely to be some damage to the road from the heavy vehicle movements and restrictions on timing of deliveries and noise. The noise and vibration assessment shows there is unlikely to be damage to properties from vibration. Assessment of the Tilbury Street bridge across the Waiwhetū stream is required to confirm allowable loads and monitor any potential damage to the bridge through the construction process. Refer to Section 5.7.1 for further discussion on the bridge.

A dilapidation survey is recommended for the properties along Summit Road (particularly on the steeper sections where vehicles will be braking or climbing under load). There is also a large (DN750) bulk watermain in Summit Road which could potentially be affected by the increased heavy vehicle movements. This survey will form a baseline condition against which any later assessments will be compared.

It is expected that Summit Road will be damaged during construction through heavy vehicle use. The road condition is to be surveyed prior to construction commencement and monitored throughout, with repairs made where required to ensure safe use of the road. At the end of the works the road may require resealing.

There is a lesser likelihood that Balgownie Grove may require repairs following heavy vehicle movement, as the anticipated heavy vehicle movements are much less. However, the road condition will be surveyed prior to construction commencement to ensure that no damage has occurred. Any damage will be repaired to pre-existing condition.

Temporary site offices and containers will be mobilised to the site. They will be placed temporarily, 1-2 months, near the site entrance off Farrelly Grove and on flat sections south of the existing reservoir until more permanent offices are placed on the Naenae reservoir roof. This will be the main contractor compound area during construction. Additionally, toilets, likely to be portaloo's, will be placed near the site entrance for convenience. A diagram of the site layout follows in Figure 3Figure 3. The site layout will not allow for public pedestrian access through to or from the firebreak to the south during the entire construction period.

Protection of the existing Naenae reservoir structure will be ensured by adhering to the following measures:

1. Load Limit: Keeping the loads on the roof below 4.0kPa (400kg/m2), which is within the load limit of the structure, to prevent overloading.
2. Protective Measures: Implementing adequate measures to safeguard the existing works during the installation of the site huts, ensuring that no damage or compromise occurs.
3. Waterproof Membrane: Installing a protective and waterproof membrane over the designated area before establishing the site huts. This will provide an additional layer of protection against water infiltration.
4. Steel Frames: If necessary, installing steel frames to distribute the loads evenly and locate them over existing columns. The detailed design and implementation of these frames will be addressed by the D&C team.

Figure 3. Site setup layout

Prior to vegetation clearance, necessary lizard relocations will be conducted, as required by the Department of Conservation lizard salvage and transfer permit, to ensure their safety. A lizard permit authorising these relocations has been applied for, but not yet granted.

Vegetation will be removed within the agreed extent of the excavation areas, along with a 2m clearance buffer zone for access, fencing, and sediment controls. The majority of the vegetation waste will be disposed of off-site, while some may be retained for stabilisation purposes. Vegetation will be cleared using a combination of hand tools, power tools such as chainsaws, mulchers and excavators where possible.

The vegetation on the small hill section north of Naenae reservoir will be removed. This area will be flattened to RL (reduced level) 66 to create a site parking area for 15 vehicles with angle parking. Site offices will be placed on top of Naenae reservoir on the north side using a crane from this cleared area. There is potential for a lease arrangement for off-site parking and a site minivan to transport operatives to the site, especially during peak times.

Site security fences, along with noise barriers, will be established around the perimeter of the planned main excavation area and the site perimeter. The construction compound will be fully fenced to provide for local offices, plant and materials storage during non-working hours. An additional construction buffer of 10-20m outside the currently designed site working perimeter will be allocated for potential shallower batters, benches, and shoring batters with fill material for stability. While not all these measures may be required, unexpected ground conditions during excavation may necessitate further stabilisation methods.

Signage and public notices will be erected around the perimeter to inform the public about the site details and the closed public access area.

In general, construction operations will occur during the day. Lighting may be required for some activities which require night works, such as reservoir base slab and roof concrete pours. Portable generator driven lighting towers may be brought to site as required and positioned to avoid the negative effectives of light spill into local properties or roads.

5.1.1 Balgownie Grove

A satellite site at the end of Balgonie Grove will be established for approximately 4-6 months to facilitate the works on the banks of the Waiwhetū stream and the pipeline works down the hill. This site will occupy the Hutt City Council land in between numbers 5 and 6 Balgownie Grove. The site will be disestablished once construction works down near the stream have been completed.

Site fencing and noise barriers will be installed, as well as a stabilised vehicle access from Balgownie Grove. A small site office may be lifted onto site. Some on-street parks on Balgownie Grove may need to be removed for the temporary storage of construction materials. Temporary access across the stream may be constructed to allow small vehicles for materials and excavation to cross the stream.

5.2 Reservoir Earthworks

Bulk earthworks will be the first significant construction activity. Approximately 83,000 m3 of un-bulked material will need to be excavated and removed from the site to create the reservoir platform. This section refers to earthworks associated with the reservoir platform, for earthworks associated with the construction of the delivery and scour pipe, refer to Section 5.4.

Clean fill will be disposed off-site, most likely to Southern Landfill. A potential cost-saving opportunity would be to export material to other existing projects in the Wellington region for reuse, rather than disposal. For example, Riverlink may be looking to acquire clayey soils, or sports fields may need to be raised. All options are currently being explored and ongoing conversations with Hutt City Council are being held to identify any opportunities.

The preferred strategy for off-site disposal of material is to progressively excavate from Summit Road and create sufficient turning area to the south of the existing Naenae reservoir. Haul roads will be created from compacted hardfill on site, to load trucks and better manage the dirt being carried onto local roads. Approximately 83,000 m3 of un-bulked material is expected to be cut and removed for the reservoir platform.

A 1:1 cut face slope batter is assumed. If this was to be made steeper, additional slope stabilisation measures may be required, which could offset cost savings in the reduction of earthworks. Further geotechnical investigation is to be completed to inform detailed design. The access road from Summit Rd will be graded to a maximum slope of 1:6. The connection to the firebreak/track is graded at a maximum slope of 1:3; this track is not expected to be used for maintenance vehicles.

For the excavation and loading out of material, 2 to 3 excavators will be mobilised. One of the excavators will primarily be used for excavating the material and transferring stockpiles, while the others will be responsible for loading the material onto trucks. Allowance will be made for excavator sizes of 2 x 30-35 tons, 1 x 20 tons, and 1 x 13 tons. These excavators will be utilised to efficiently carry out the excavation and material handling tasks on the site.

Rigid 6- and 8-wheel trucks will be used for the initial stages of excavation, handling the first third of material removal. Once the site allows truck and trailer units to turn around within the boundary and working area, these will take over. An average of 50 truck trips per day is expected

during the earthworks phase, with an average of 12 minutes between trucks up and down Summit Road.

5.3 Erosion and Sediment Control

Erosion and sediment control is a key part of the construction methodology, with a specific focus on protecting the Waiwhetū Stream and the nearby wetlands from construction run-off. A separate Erosion and Sediment Control Plan (ESCP) is being produced as part of the consent application and is to be read in conjunction with this methodology; a layout of key erosion and sediment control measures is provided with the ESCP. The ESCP considered four main construction activities:

1 Earthworks for the reservoir.
2 Reservoir construction, including associated construction on the main platform.
3 Construction of the scour and delivery pipes down the hill.
4 Work in and around the Waiwhetū Stream.

Key erosion and sediment controls will include the following:

- Clean water diversion bunds at the perimeter of the reservoir site, prevent clean runoff entering the site.
- Super silt fence located around the perimeter of the site, capturing sediment as in any water runoff.
- Grading of the main construction platform to capture and treat water in two sediment retention ponds (SRP). These ponds will discharge treated water to the top of the adjacent gullies, riprap will be used as scour protection.
- Filter socks along the contours of the hill between the construction site and the Waiwhetū Stream. These are secondary measures to restrict sediment mobility and protect the wetlands.
- A decanting earth bund (DEB) at the base of the scour and delivery pipe alignment, adjacent to the Waiwhetū Stream. This will treat runoff from the construction area around the stream and from the alignment down the hill. An open channel along the edge of pipe corridor will direct runoff to the DEB.
- Dust suppression using water spray during construction, where possible water in the SRPs will be used to conserve water.
- Use of a lamella sediment tank to treat water from trenches around and through the Waiwhetū Stream. Water will be discharged to the Waiwhetū Stream downstream of the of construction area.
- Undertake major earthworks during summer to reduce the risk of rain during land disturbing activities.
- Stabilise exposed surfaces as soon as earthworks are complete. Where trafficked use washed and compacted aggregate, use a combination of matting and hydroseeding on temporary cut faces. Permanent stabilisation measures, such as revegetation, should be enacted as soon as possible.

5.4 Delivery and Scour Pipe Hill Section

The section of pipeline from the reservoir platform to the Waiwhetū Stream will traverse a bush-covered hillside. The chosen method of construction for the combined alignment of the scour and overflow pipes is buried pipe via open excavation. The route for the pipes will follow the ridge to the north of the valvehouse towards Waiwhetū Stream and Balgownie Grove.

The indicative trench width for the delivery and scour pipe will have a nominal width of 3m and a typical depth of 2m, as shown in Figure 4. Trench depth may increase in places if unsuitable ground material exists; initial Geotech investigations indicate the ground will primarily be moderately to highly weathered Greywacke Rock. Where unsuitable material is encountered,

material would be undercut and replaced with an approximately 500mm combination of imported hard fill and geogrid. A 7m working area adjacent to the trench has been allowed for to accommodate construction vehicles and material laydown or stockpiling. An additional 1m at each side of the trench and working area has been allowed for, providing room for ESCP devices and a buffer to slope edge. An overall corridor width of 14m has therefore been allowed for in the construction of the delivery pipeline. This corridor width may be optimised to reduce disturbance during detailed design, methods such as trench shoring, or material stockpiling on the reservoir platform may be used.

Prior to the construction of the pipelines, lizard relocation and vegetation clearance will be required. Vegetation clearance will be completed using hand tools, power tools such as chainsaws, mulchers and excavators, cleared vegetation will be removed from site; some may be mulched and used to stabilise exposed dirt if required. Once the vegetation is cleared and preliminary ESCP devices, such as the super silt fence, are established, the 14m construction corridor will be excavated along the ridgeline. The bulk earthworks, approximately 7,000 m3, are to be undertaken outside of the winter season. Access to excavate the ridge will be from the reservoir construction platform and work will progress down the hill. Excavated material may be temporarily stockpiled on the reservoir platform and loaded onto larger truck and trailer vehicles for disposal. As excavation of the ridgeline progresses, the exposed working platform will be graded to the west and stabilised; compacted aggregate will be required for the trafficable areas. Due to the steepness of the ridge, tracked vehicles are recommended; in some sections a winch may be required to assist vehicles. Assessment of slope stability will be required throughout the works, as slope collapse is a significant risk, a minimum distance to slope edge should be assigned once further geotechnical studies are undertaken. The designation envelope will allow for minor slope stabilisation measures to be undertaken where required.

Access to the ridgeline for pipe installation can be from either from the reservoir platform or a temporary staging bridge across Waiwhetū Stream from the end of Balgownie Grove, refer Section 5.5.3. Due to the confined nature of the ridgeline, vehicle movement may be in one direction with vehicles accessing from the reservoir platform and egress across the stream. The area at the end of Balgonie Grove will be used as a staging area to crane lift equipment across the stream. The pipework will be installed in stages, backfilling and stabilising as the work progresses. While the corridor allows for vehicle access alongside the pipe, protective cover may be required over the pipes to prevent vehicle damage. Pipe work will be installed from the bottom up, this provides thrust load bearing for the installed pipes. Dust will be controlled by the use of water carts where required.

Bedding material will be placed, followed by the installation of the pipes. The trench will then be backfilled and compacted to match the grade. Benching will be required for the trenches, and shoring may be necessary depending on further geotechnical assessment. If the rock is deemed stable enough, shoring may not be required for the entire construction alignment, or benching may be utilized.

Water stops will be installed at intervals of every 5 meters for grades steeper than 20% and a subsoil drain is recommended along the length of the pipe. Increasing water stop spacing is recommended to be further investigated during detailed design. In the steep sections of the trench, stabilized fill material may be necessary for backfilling and to serve as a continuous water stop.

The successful contractor will nominate the preferred material for the pipelines, from either HDPE or concrete lined steel (StCL). The engineer shall also assess the suitability of the contractor's preferred material and Wellington Water will be required to give approval. Due to the slope of the site and available construction area, material selection should suit the expertise of the successful contractor.

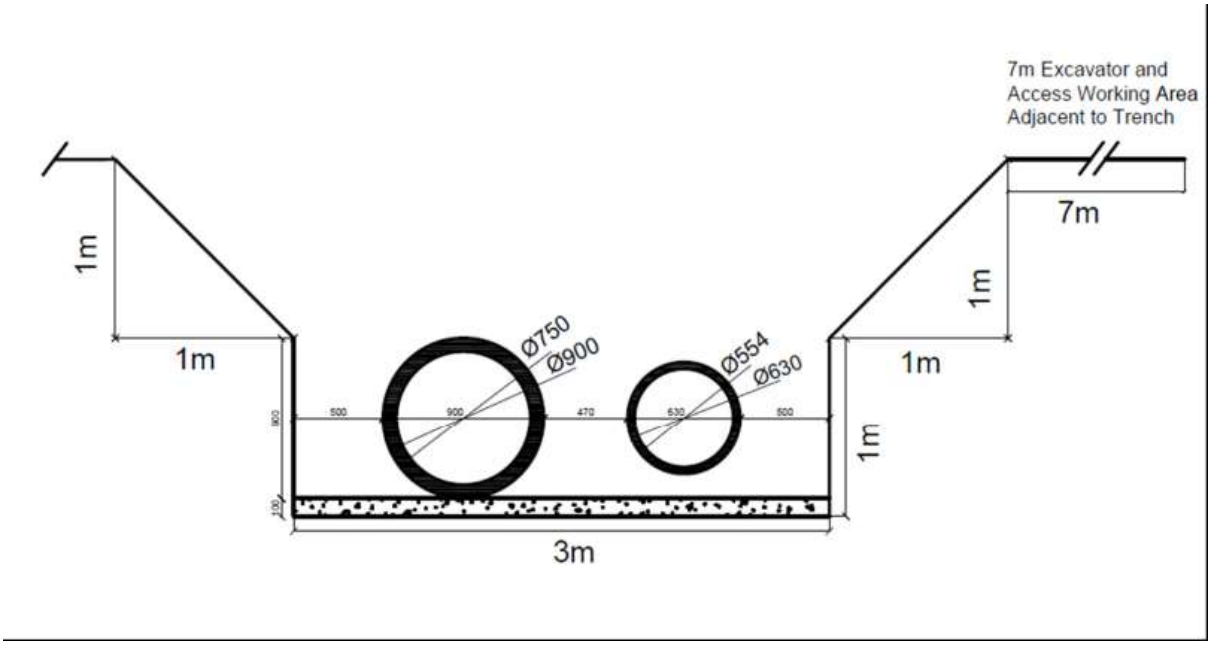


Figure 4. Indicative trench section for delivery and scour pipes

During the construction process, water runoff will be managed by creating earth bunds and channels down the western edge of the corridor using surrounding material. This will divert dirty water from the work area to a decanting earth bund between the base of the hill and the Waiwhetū Stream. Super silt fences along the perimeter of the corridor and filter sock will provide additional barriers to sediment mobility. The vehicle track will require maintaining, with assessments completed after rain events to ensure scouring does not present additional hazards.

Permanent re-vegetation is to occur as soon as practical to stabilise the surface. This will depend on adjacent construction activities and optimal planting season, refer Section 5.11.

5.5 Waiwhetū Stream Crossing and Outfall

Work adjacent to the Waiwhetū stream will require staging at the end of Balgownie Grove.

The delivery pipe stream crossing will be below-ground; constructed by either directional drilling or open trench techniques. For the purposes of consenting we have assumed open trench.

To construct the trench through the stream bed, cofferdams will need to be established through sheet or secant piling and bypass pumping of Waiwhetū Stream. Fish barriers and other fish management measures will be required as outlined in the WSP ecology assessment. Sheet piling will be used to reduce the local groundwater draw-down effects. Surface and ground water will need to be pumped from the laid-dry area. A pit, approximately 1m x 1m, shall be excavated in the laid-dry area and a pump installed in this.

Cofferdams will also be used where the gabion baskets are installed on the scour outfall, however if possible, passage for the stream will be allowed for around the piling.

Access to undertake works on the southern bank of the stream will be from the top of the hill, using the same access for the delivery and scour pipes, or a temporary staging bridge across the stream, refer Section 5.5.3. Works on the southern side of the stream are within a floodplain for the Waiwhetū Stream, a separate assessment is being undertaken to assess the impact of the works on the flooding properties of the stream. Weather is to be continuously monitored for heavy rain events during works, allowing time to remove personnel and equipment from the flood plain if required.

There is a DN225 stormwater main in the grassed area at the end of the Balgownie Grove cul de sac which clashes with the new DN750 delivery pipe. The stormwater pipe will require relocation to allow for construction of the below-ground stream crossing.

We have confirmed the presence of wetlands on site and have established a 10 m buffer zone to ensure protection of the wetland, refer to Section 5.5.1 regarding the impact of dewatering on wetlands.

5.5.1 Dewatering

Trenches for pipe construction around the Waiwhetū Stream are likely to require dewatering and trench support. Trenches will be dewatered continuously, including during the night, with water being treated through a lamella style sediment tank prior to being discharged to the Waiwhetū Stream.

There is a risk of ground subsidence in neighbouring areas as a result of dewatering. The appropriateness of different construction techniques, the need for dewatering and its effects have been assessed by a Hydrogeologist. A separate Dewatering Report is appended to the AEE and NOR application and is to be read in conjunction with this methodology.

The key findings of the report are summarised as:

- Over a total drawdown period of 2 weeks, any drawdown effects on the wetlands would be temporary and would recover to natural conditions after completion of the works.
- Should the construction of excavations adjacent to the stream exceed 2 weeks, the following mitigations can be adopted:
    - Ensure no single excavation is open for longer than 14 days;
    - Allow natural ground water to recover before starting on next excavation;
    - Ground water can be monitored through the use of monitoring wells.
- Where an excavation is required to remain open in excess of 14 days, further assessment of drawdown effects will be required.

5.5.2 Overpumping

Overpumping of the stream will be required during the construction of the submarine crossing, which is expected to take no longer than 1 week during the summer season. Pumps are to be located on the north bank of the stream and will discharge water back into the Waiwhetū Stream. The overpumping will be undertaken by a separate pump to the dewatering pumps, and powered by a generator on site, pump and generator will be provided with separate noise screens.

Flow data for the Waiwhetū Stream was obtained from the Greater Wellington Regional Council Environmental Data Dashboard, from the closest data site at Whites Line East. Data was assessed from 1 September 2012 to 31 March 2023, excluding the months of April to August inclusive. Flow data showed that during rain events the flow rapidly increased, largely due to the large catchment which feeds into the Waiwhetū Stream. The pumps were therefore sized primarily to handle the base flow of the stream, which is the median flow, it is not considered practical to size pumps for peak flows. The median flow rate of the stream at White Lines East during the period assessed was 155 L/s. In order to size the pump to sufficiently handle fluctuations in flow over a short period of time, the pump is to be sized at 500 L/s such that it can handle stream flows at least 90% of the time. Should the flow exceed this rate, the cofferdams will be overtopped and the area will flood. Some clean up and additional dewatering of the trenched section may be required.

The works within the stream bed needs to be timed to ensure that a suitable window is available where no rain is predicted and therefore reduce the risk of flooding the work area. Weather

forecasts should be monitored during the installation to ensure that the work area is cleared of any loose equipment. Further data may be collected at the location of the Stream crossing to refine the pump sizing.

5.5.3 Temporary Vehicle Bridge

A temporary staging bridge across the Waiwhetū Stream is to be established to assist in the construction of the pipes down the hill and the works around the stream. The bridge will be a prefabricated deck installed on driven piles, crossing at a level high across to the hill on the hill side of the flood plain. Piles are to be located such that they are not driven through the stream bed. Due to the presence of the private properties on the north bank of the stream and the wetlands on the south bank of the stream, the bridge can only be located along a similar alignment to the delivery pipe stream crossing. The temporary staging bridge will therefore need to be removed prior to construction of the stream crossing.

The staging bridge may be installed for up to 4 – 5 months, primarily over the summer period. A separate assessment of the effect of the bridge on the stream, especially how it may impact flood flows, is currently being conducted as part of the consent application. This assessment will identify preferred timing for the bridge to be established, based on historic flow data of the Waiwhetū Stream. It will also clarify the relative level of the bridge deck and any flood mitigations required. The bridge is to be designed such that in the event of heavy flooding, no part of the bridge is washed downstream.

5.6 Farrelly Grove and Summit Road Works

As part of the project several pipes are to be installed within the carriageway of Farrelly Grove and summit Road, this includes:

- Installation of the DN750 inlet pipe, tying into the existing bulk water main.
- Installation of the DN500 delivery pipe connecting the Naenae reservoir to the new reservoir. This includes tying into several mains providing water to Farrelly Grove and Summit Road.
- Installation of the new DN300 scour pipe connecting the existing Naenae reservoir scour to the new DN500 scour pipe.

The construction of these pipes is recommended to occur after the construction of the delivery and scour pipes down the hill to Balgownie Grove. This is to prevent the need to resurface a new road due to heavy vehicle use. The works within the carriageway are a permitted activity and further detail will be provided as part of the corridor access request (CAR).

The sections of these pipes up the site access road will be installed after the construction of the delivery and scour pipes down the hill to Balgownie Grove. This will ensure no damage to the pipes occur from heavy vehicle trafficking. The pipes are to be constructed using open trenching, backfilling the trench as the works progress. Excavated fill will be stockpiled on site to drain before removing off-site, or for backfill if appropriate. It is recommended that pipes up the access track are installed with pipe protection measures, protecting them from heavy vehicles during the remaining construction of Eastern Hills reservoir and future proofing for the replacement of the Naenae reservoir.

5.7 Traffic Implications

A separate Construction Traffic Assessment (CTA) has been prepared as part of the consent application and is to be read in conjunction with this methodology.

5.7.1 Reservoir Construction

There will be approximately 10,200 heavy vehicle trips to site over the construction period. Traffic for transport of panels and beams may require access to site outside of the core working hours to

comply with transportation permits i.e., be off the road before 7am. Concrete pours for the floor and roof of the reservoir, refer Sections 5.8.1 and 5.8.4, will involve trucks turning up to site from approximately 3am. A Construction Traffic Assessment has been completed by WSP, providing further details of the effects and proposed mitigation and managerial measures.

Traffic management will be required for the large delivery of the precast beams, columns, slabs, transporters for plant and machinery, and construction materials on transports. Traffic management will be required on Summit Rd to manage the trucks (and trucks with trailer units) during the excavation phase of works. This will require removal of a significant amount of on-street car parking along Summit Road and Tilbury Street. Coordination will be necessary at the intersections of Tilbury St, Waiwhetū Rd, Riverside Dr, Summit Rd, Laura Fergusson Dr, and Farrelly Gr.

Indicative Traffic Management Plans (TMP) have been produced and are provided in Appendix A. A 30 km/h speed restriction will need to be in place on surrounding streets.

Table 1 below summarises the main works associated with noise and traffic movements for Summit Road.

The designated traffic route for all deliveries to and from the site, connecting to State Highway 2 (SH2), will be as follows. Note that construction traffic from this project may cause some delays to the traffic on the existing road network during some days, depending on the activities occurring on site.

Summit Road ➔ Tilbury Street ➔ Waiwhetū Road ➔ Naenae Road ➔ Daysh Street ➔ Fairway Drive ➔ Kennedy Good Bridge ➔ Then, depending on the direction required on SH2, vehicles can turn left or right. This is outlined in Figure 5 below.

This traffic route ensures a clear and specified path for deliveries, allowing for efficient transportation to and from the site while managing disruption to local traffic and ensuring safe access to and from SH2.

Figure 5. Traffic route for vehicles between site and SH2

Construction vehicles will need to cross a bridge across the Waiwhetū Stream on Tilbury St, at the base of Summit Rd. The bridge has no visible max capacity indicators and a review conducted by WSP found that the bridge is not on the list of structures typically checked for overweight permits; this could mean that the load capacity of the bridge is adequate, or more likely that it is not on typical overweight vehicle routes. Recent works on the Naenae reservoir had fully laden trucks removing earthworks. There are alternate locations that overweight vehicles, such as crawler cranes, can cross the Waiwhetū Stream; this includes bridges at Rossiter Ave and Norton Park Ave. Further assessment has not been conducted at this stage to assess the capacity of the bridge or to apply for an overweight vehicle permit. The successful contractor will need to complete this based on their final design and construction methodology.

5.7.2 Pipeline Construction

The installation of pipelines will require trucks to transport materials to the site; however, these will be significantly reduced in number and weight to those required for the bulk earthworks and reservoir construction. It is expected that approximately 700 heavy trucks are expected to the site to dispose of cut material, over a 7–9-month period. Given the lack of storage room at the site, it is likely that truck movements will be regular but less frequent as they will be matching construction progress. Temporary traffic management using parking restrictions on Summit Road is expected to be in place during this period.

Access to Balgownie Grove will follow a similar route as to Summit Road, with a slight variation. Instead of Naenae Road, vehicles will use Waddington Drive to reach Balgownie Grove from Naenae Road.

Table 1. Summary of works for Eastern Hills Reservoir and associated noise and traffic movements

Stage of Construction Work (refer to programme for more details)	Key activities including significant Noise/Vibration Generators	Expected Duration	Vehicles, Access, Traffic Controls	Expected Heavy Vehicle truck movements [1]	Expected Peak AADT [1,2] (Heavy Vehicle)
<u>Site Establishment</u> • Site clearance • Vegetation removal • Formation of temporary access road • Site set up	• Chainsaws, tree felling and mulching. • Excavators moving earth. • Truck movements to deliver site facilities and equipment	1-2 months	• Entry and exit via Summit Road. • Excavators and trucks. • No public access through to the firebreak from now until project completion.	100	20
<u>Earthworks for reservoir</u>	• Excavators moving earth and cutting site to platform level. • Truck movements loading and unloading.	9-10 months	• Entry and exit via Summit Road. • TMP and reduced speeds on Summit Road and surrounding streets. • Heavy excavators. • Rigid 6- and 8-wheel trucks. • Truck and trailer units (once space on site allows).	9,100	50
<u>Enabling works for pipeline</u> • Lizard relocation • Vegetation removal • Earthworks	• Chainsaws, tree felling and mulching. • Excavators moving earth. • Truck movements loading and unloading.	1 month	• Entry and exit via Summit Road. • TMP and reduced speeds on Summit Road and surrounding streets. • Excavators and trucks. • Truck and trailer units for half the excavated material.	50	5
<u>Install scour and delivery pipeline</u> • Lizard rehousing • Trench excavation • Install delivery pipe and overflow/scour pipe • Install cross-connections between Naenae 1 and EH reservoir	• Hydraulic excavators cutting material. • Truck movements, loading and unloading. • Limited vibratory driving of sheet piles in area adjacent to wetland/stream. • Concrete trucks and pumps. • In-situ concrete placement. • Pipe laying and backfill compaction.	6-7 Months	• Majority of plant will enter and exit via Summit Road. • Limited access from Balgownie Grove. • TMP and reduced speeds on Summit Road and surrounding streets. • Excavators, large and small Hiab/flat bed, 10 tonne tipper trucks, truck and trailer units, concrete mixers, concrete pumps, compaction roller, etc.	470	50

Stage of Construction Work (refer to programme for more details)	Key activities including significant Noise/Vibration Generators	Expected Duration	Vehicles, Access, Traffic Controls	Expected Heavy Vehicle truck movements [1]	Expected Peak AADT [1,2] (Heavy Vehicle)
<u>Stream Pipe Crossing and Stream Outfall</u> • Install bubble-up chamber, swale with rip rap to stream • Install pipe crossing	• Hydraulic excavators cutting material. • Truck movements, loading and unloading. • Concrete trucks and pumps. • In-situ concrete placement. • Pipe laying and backfill compaction. • Drilling piles.	1-2 months	• TMP and reduced speeds on Balgownie Grove. • Entry and exit from Balgownie Grove for concrete trucks, 13t excavator, rigid truck, small Hiab/flat bed, 10 tonne tipper trucks, concrete pumps, crane, etc. • Limited access from Summit Rd via track down pipeline for excavators.	30	5
<u>Reservoir construction</u> Substructure and base slab, walls and columns, beams and roof, waterproofing	• Bored piling with potential for vibratory casing installation in some areas. • Concrete delivery, pumping and vibrating in pours spread over the period. • Pre-cast deliveries. • Erection of formwork with hammering. • Short term concrete breaking/ roughening tools. • Large cranes lifting panels into place.	8-9 months	• Entry and exit via Summit Road. • TMP and reduced speeds on Summit Road and surrounding streets. • Large and Small Hiab/flat bed, heavy plant transporters, crawler cranes, 10 Tonne Tipper trucks, truck and trailer units, concrete mixers, concrete pumps, drilling rig for piles, etc.	300	60
<u>Valve house construction stage 1</u> Construction of base slab, pipes, and anchor blocks	• Concrete delivery, pumping and vibrating in pours spread over the period. • Short term concrete breaking/ roughening tools. • Compaction Rollers. • Pipe laying and backfill compaction.	1-2 months	• Entry and Exit via Summit Road. • TMP and reduced speeds on Summit Road and surrounding streets. • Large and small Hiab/flat bed, concrete Mixers, concrete pumps etc.	40	15

Stage of Construction Work (refer to programme for more details)	Key activities including significant Noise/Vibration Generators	Expected Duration	Vehicles, Access, Traffic Controls	Expected Heavy Vehicle truck movements [1]	Expected Peak AADT [1,2] (Heavy Vehicle)
<u>Valve house construction – stage 2</u> Roof, walls and mechanical fit out	• Truck movements, loading and unloading. • Concrete delivery, pumping and vibrating in pours spread over the period. • Erection of formwork with hammering. • Short term concrete breaking/ roughening tools. • Large cranes lifting panels into place.	1-2 months	• Entry and exit via Summit Road. • TMP and reduced speeds on Summit Road and surrounding streets. • Large and Small Hiab/flat bed, Heavy plant transporters, 10 Tonne Tipper trucks, truck and trailer units, Concrete Mixers, Concrete Pumps etc.	10	4
<u>Landscaping and reinstatement</u>	• Trucks delivering topsoil and mulch. • Excavators spreading topsoil and mulch. • Chipseal surfacing of access road. • Planting of trees and shrubs.	1-2 months	• Entry and exit via Summit Road. • Excavators, 10 tonne tipper trucks, truck and trailer units.	200	20
	<u>Total Duration</u>	30-36 months			

Notes:

1 Round trip-i.e. in and out counted as one movement.
2 AADT (Annual Average Daily Traffic).
3 On-site vehicle movements not accounted for.

5.8 Reservoir structure

Detailed sequencing drawings of the reservoir construction are provided in Appendix B.

5.8.1 Reservoir foundations and slab

Once the bulk excavation of the reservoir footprint reaches the target RL (reference level), a detailed trim will be conducted to achieve the underside of the base slab level. Drilled concrete piles will be installed around the perimeter of the tank for slope stabilisation, piles and capping beams will be cast insitu. All pipework that passes through the base slab of the reservoir will then be installed, followed by backfilling and casting of thrust blocks where necessary.

The foundation ground improvements will entail a 500mm raft foundation, the engineered fill be imported into the base of the excavation will be compacted to appropriate lines and levels and a layer of hard fill imported, placed and compacted.

Leak detection trenches will be set out and installed within the blinding layer with a minimum 1:100 fall towards the external monitoring/drainage collection point. The leak detection trench will consist of a concrete base and walls, with a punched pipe in a drainage aggregate surround, wrapped in bidim filter fabric. There will be a sand bedding layer on top to match the top of the blinding level.

During the concrete placement, a single pour will be executed using a 58m concrete pump and a 32m concrete pump positioned on either side of the north end of the reservoir footprint. The estimated concrete volume is approximately 300 m3, which translates to around 50 concrete truck deliveries.

The single pour will require night works to occur, with trucks arriving on site from approximately 3am. While undertaking the pour in two parts is possible, it is not the preferred methodology from a technical standpoint, as well as not removing the need to undertake night works; it would require twice the amount of night works due to the size of the pours. Both physical and managerial mitigations, involving noise barriers and community engagement will be employed for the night works[2].

After the slab concrete has gained sufficient strength, the tendons will undergo an initial partial stressing, also known as an anti-crack stressing, followed by a full stressing process. The stressing will be carried out in a prescribed sequence, aiming to achieve a target tendon stress. Hydraulic jacks will be employed at the stressing end for this purpose. Once the target stress is attained, the tendons will be locked off, and the ducts will be grouted to secure the tendons in place.

5.8.2 Craneage

Crawler cranes and smaller Hiab cranes will be used throughout the construction of the reservoir and associated pipework.

The crane's location will vary depending on the specific tasks being carried out during the construction process. The key positions and lifts for the crane are as follows and outlined below in Figure 6.

- Pile reinforcing: Crane located on gravel raft in the middle of the tank.
- Below-tank pipework: Crane located on gravel raft in the middle of the tank.
- Wall panels, infill stitches, and precast roof elements: Crane inside the tank on a gravel raft.
- Final roofing elements and wall panels: Crane positioned on exterior pad.

[2] WSP, Noise and Vibration Assessment, October 2023, Section 8

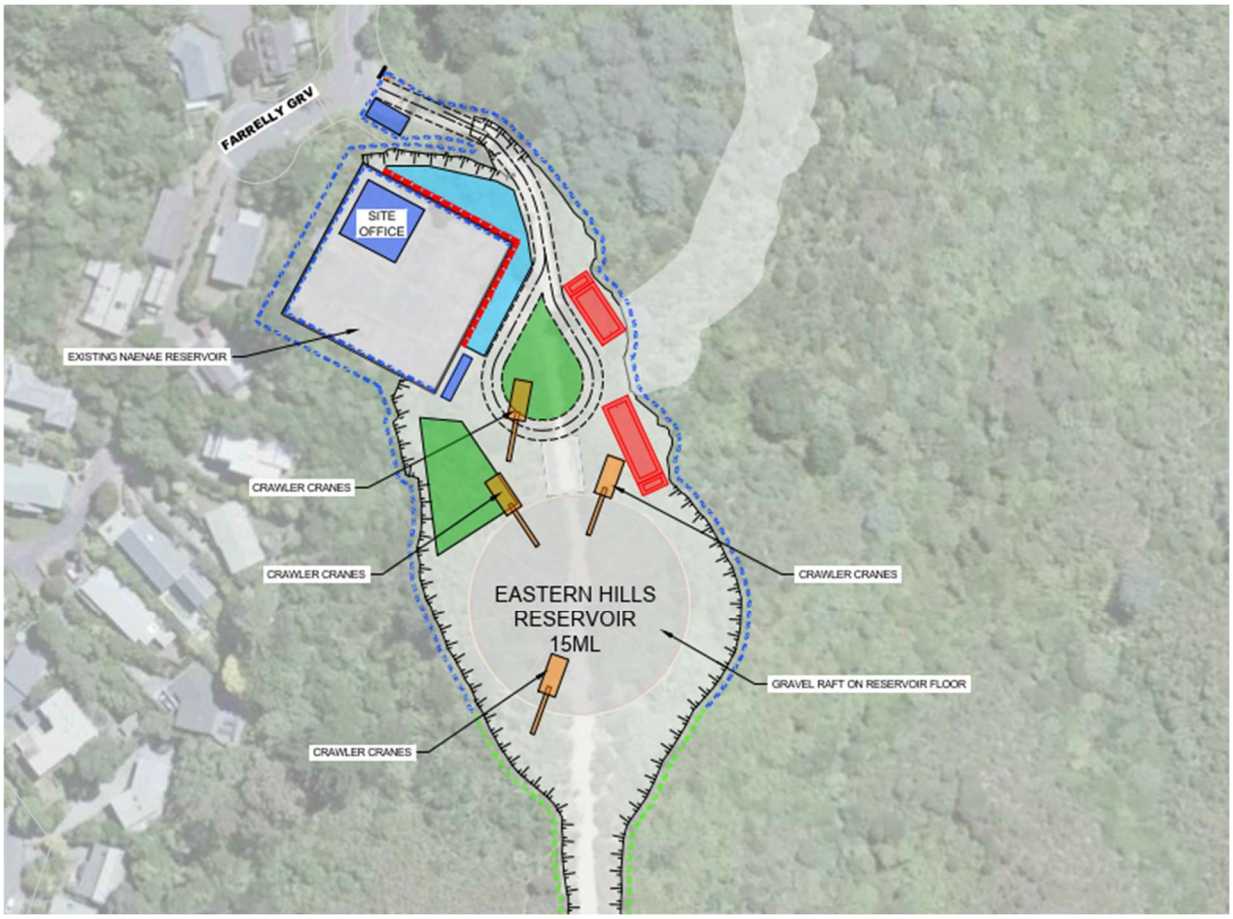


Figure 6. Potential crane locations

5.8.3 Reservoir Walls and Columns

To facilitate the construction of walls, pilasters, and columns, precast elements will be manufactured off-site and transported to the construction site using transporter trucks. The wall panels will be post-tensioned circumferentially, starting from the pilaster panels.

Here are the key points regarding the transportation, offloading, and installation of these precast elements:

- Offloading and Storage: The precast wall panels and columns will be offloaded from the transporter trucks using a crawler crane. These elements will be stored on the flat laydown area adjacent to the reservoir as well as on the base slab itself.. It's important to note that due to their size, these precast elements may be considered notifiable loads; delivery times may be subject to restrictions, such as early morning deliveries with vehicles off the road before 7am.
  The size of the site limits the number of elements that are able to be stored on site, therefore it is expected that deliveries will occur throughout construction, with elements largely delivered as required.
- Temporary Access: Temporary access routes will be established to allow the crawler crane to track onto the base slab. This access will also accommodate concrete trucks and pumps for ongoing concrete pours during the construction process.
- Vertical Installation: The wall panels will be stood vertically using temporary propping and footing restraints. The installation will commence on the south side and progress around to the north side of the reservoir.

For further information on the sequencing plans for the construction of the reservoir, refer to Appendix B.

5.8.4 Reservoir Beams and Roof

The construction of the reservoir roof structure involves the use of precast beams and slabs, along with an insitu topping slab. The precast elements will be fabricated offsite and delivered to the construction site on transporters. Traffic Management will be implemented to facilitate the coordinated delivery and offloading of these components, refer to Section 5.8.3 for more information on the delivery and storage of precast elements.

The installation process will begin with the lifting and positioning of columns and beams, starting from the south side and progressing northwards. This sequential approach allows the crane and access plant to work outward while considering the lifting capabilities of the crane.

The precast roof elements will be installed, followed by pouring the insitu topping slab using two concrete pumps. Approximately 200-250 m3 of concrete will be used for the roof pour, requiring around 40 truck deliveries. The roof surface will be pitched for drainage, and a waterproofing layer will be applied. Similar to the reservoir slab, the roof will be undertaken in a single pour which will include night works.

Access stairs, handrails, and security features will be installed for safety.

5.9 Reservoir Pipes, Mechanical and Electrical Installation

The construction process for the reservoir will be carried out in two phases to ensure ample working space on-site. Phase 1 will focus on installing the below-ground pipework, the base slab, and the lower half section of the valve chamber walls below RL66m (a reference level). This phase will commence once sufficient excavation has been completed prior to the reservoir construction. Detailed excavation and trimming will be performed up to the invert level of the valve house and the pipework mains.

During Phase 1, the sections of the inlet, outlet, and scour pipes that lie beneath the reservoir footprint will be positioned and installed concurrently with the construction of the in-situ base slab of the valve house. The lower half of the valve house end wall will be cast, incorporating the pipes and adjacent thrust blocks. The pipe sections at each end of the valve house will be temporarily capped, and the half chamber will be temporarily backfilled with bedding material and a protective layer. This arrangement will allow for plant and materials to traverse over the footprint during the reservoir construction.

Phase 2 will take place when the reservoir construction is nearing completion. In this phase, the protection layer and fill material surrounding the valve house will be removed. The area will undergo thorough cleaning, and the top half of the valve house walls will be constructed. The roof of the valve house will be built using precast panels and a topping slab. There might be an opportunity to install and position some of the pipe and valve work into the chamber before the construction of the roof slab.

The upper half of the valve house will house mechanical valves and pipe sections, which will be installed and bolted together. Cranes, skids/rollers, and chain blocks will be used for lifting. The valve house will also house the mains switchboard and control panels for electrical, control, and monitoring components.

5.10 Reservoir Testing and Commissioning

Testing, disinfection, and commissioning of the reservoir and pipework will occur progressively as elements are completed. The delivery pipe will be tested and disinfected upon installation. Pipework inside the reservoir will undergo pressure testing. Once all mechanical valves are installed, corresponding pipe sections will be tested and disinfected. The reservoir will be filled for a leak test and monitored for damp patches. After repairs, the reservoir will be left filled to ensure complete healing. It will then be emptied slowly through the silt ponds to control pH levels.

Once emptied, permanent pipes and valves will be connected, and a second disinfection fill will be conducted. The reservoir will be left for a week for bacteria testing. Controlled emptying with dechlorination will follow, while monitoring water quality. Within two days, the final fill will connect the reservoir to the network.

5.11 Planting and Landscaping

The fire break access track will be reconnected, extending from the site entrance to the top end of the site. Grading work will be done on the eastern side of the excavation cut to ensure proper width and grade for emergency vehicles.

Between the reservoirs, the flattened area will feature a combination of grass, low-level plants, and hard surfacing. The sections where vegetation was cleared for the delivery pipe installation will be replanted with shallow-rooted plants.

Upon completion of the installation of the delivery pipe and the structures at the Waiwhetū stream crossing, the disturbed landscape will be graded to look more natural and permanent planting will be established. Topsoil may be required to be transported from the reservoir construction platform, down the ridgeline.

Establishing permanent planting is considered the best method to reduce the site erosion and sediment mobilisation and is therefore important to consider throughout the construction process. During detailed design sequencing will need to identify the earliest possible time permanent planting can be established, taking into account:

- Risk of damage to any revegetation due to adjacent construction activities.
- For planting over buried assets, or along access routes, ensure assets have been tested and accepted prior to planting.
- As new vegetation provides habitat for fauna, specifically lizards and birds, planting should be as per the Landscape Planting Plan and Vegetation Management Plan.

5.12 Disestablishment and Remediation

Disestablishment of the construction site will involve the removal of site offices and facilities, and temporary fencing and barriers and temporary works required for the construction. Erosion and sediment control measures will be left in place until completion of landscaping and planting, with remediation of earthen bunds and sediment retention ponds being remediated prior to silt fences, such that these can be landscaped. Filter socks installed along the contours of the hill provides passive mitigation of sediment mobility while vegetation establishes and can be left in place to protect the wetlands and Waiwhetū stream; biodegradable material is to be used in the construction of filter socks.

During the construction period the significant number of heavy vehicles on Summit Rd, Tilbury St and Balgownie Grove are expected to damage the road surface, even where pipes are not installed in the corridor. These roads will need to be monitored during construction to ensure that this damage does not introduce hazards such as potholes, with maintenance occurring throughout if required. At the end of construction it is likely that these roads will require resurfacing. Where possible, this is to be combined with the installation of new assets in the road corridor, as part of this reservoir project or the associated pipeline project, to provide cost and construction efficiency.

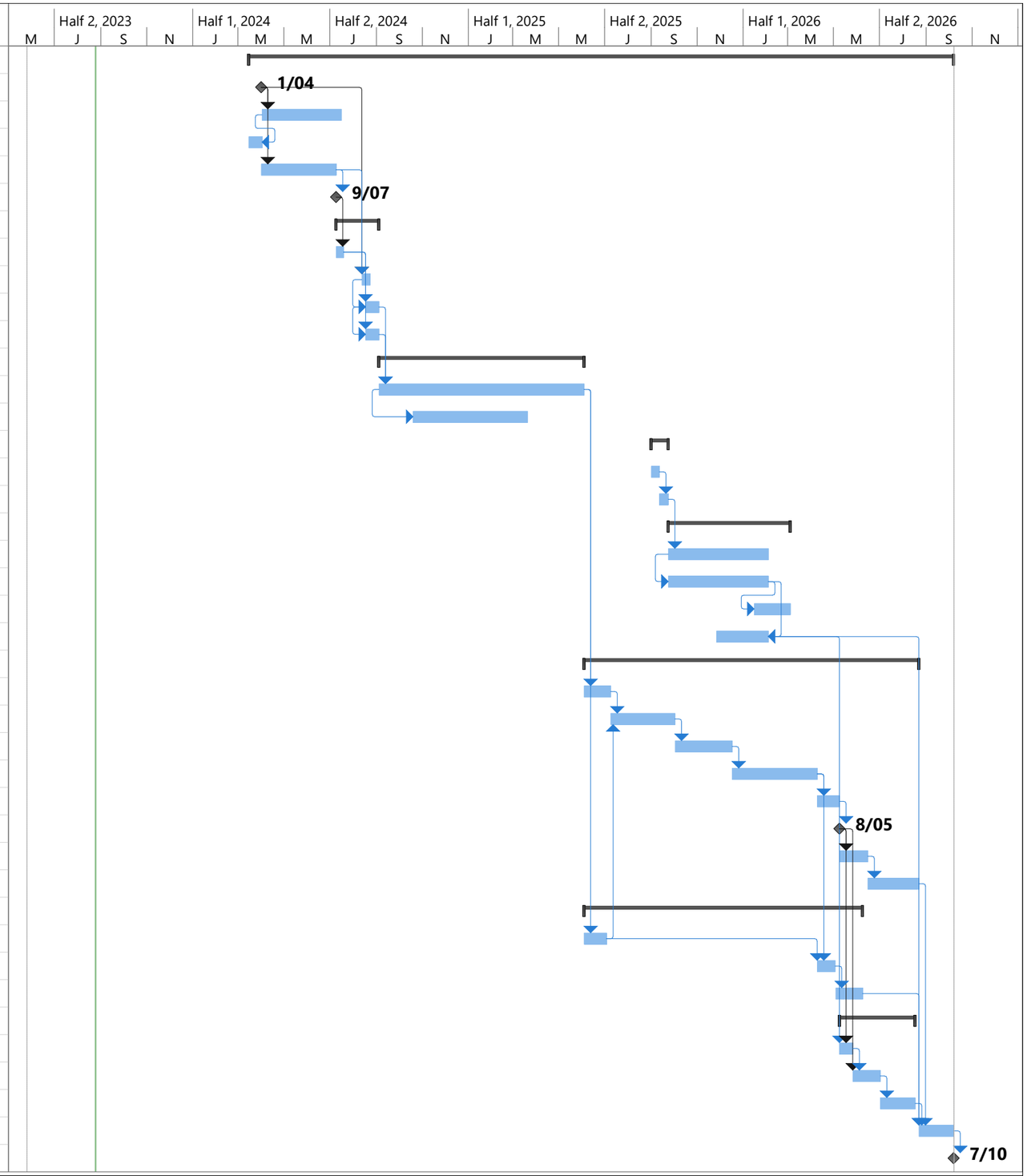
Any damage to private property during the construction should be assessed and remediated as soon as possible.

6 Limitations

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for Wellington Water ('Client') in relation to the Eastern Hills Reservoir Construction Methodology ('Purpose') and in accordance with the Wellington Water Consultant Project Engagement form dated 10th March 2023 ('Agreement'). The findings in this Report are based on and are subject to the assumptions specified in the Report and Offer of Services dated 10th March 2023. WSP accepts no liability whatsoever for any use or reliance on this Report, in whole or in part, for any purpose other than the Purpose or for any use or reliance on this Report by any third party.

Appendix A
Construction Programme

ID	Task Mode	Task Name	Duration	Start
1		**Eastern Hills Reservoir Construction Programme**	**779 days**	**Fri 15/03/24**
2		Contract Award	0 days	Mon 1/04/24
3		Detailed design development from 30% to IFC	90 days	Tue 2/04/24
4		Early drafting of Mgmt Plans prior to consent approval	15 days	Fri 15/03/24
5		Mgmt Plans & Permits, including review and approval	85 days	Mon 1/04/24
6		Start on site	0 days	Tue 9/07/24
7		**Site Establishment**	**50 days**	**Tue 9/07/24**
8		Establishment - fencing, site offices and compound	9 days	Tue 9/07/24
9		Rehousing lizards - reservoir area	10 days	Mon 12/08/24
10		Vegetation clearance - Reservoir and working platform	15 days	Sat 17/08/24
11		Erosion and sediment control measures	15 days	Sat 17/08/24
12		**Earthworks for Reservoir**	**220 days**	**Wed 4/09/24**
13		Cut to waste off-site - 100,000m3	220 days	Wed 4/09/24
14		Cut slope and eastern batter stabilisation	120 days	Sat 19/10/24
15		**Enabling works for Pipelines**	**20 days**	**Mon 1/09/25**
16		Rehousing lizards for pipeline works	10 days	Mon 1/09/25
17		Vegetation clearance - pipeline	10 days	Thu 11/09/25
18		**Install scour and delivery pipeline**	**130 days**	**Tue 23/09/25**
19		Cut to waste off-site - 8,400m3	105 days	Tue 23/09/25
20		Scour and delivery pipe install and connection	105 days	Tue 23/09/25
21		Stream outfall and stream crossing (with sheet piling)	40 days	Thu 15/01/26
22		Cross-connections between Naenae and Proposed Reserv	50 days	Wed 26/11/25
23		**Reservoir Construction**	**370 days**	**Tue 3/06/25**
24		Ground improvements - piling and capping beam	30 days	Tue 3/06/25
25		Reservoir substructure and base slab	75 days	Wed 9/07/25
26		Reservoir walls and columns	65 days	Thu 2/10/25
27		Reservoir beams and roof	85 days	Wed 17/12/25
28		Reservoir waterproofing	25 days	Thu 9/04/26
29		Reservoir structure complete	0 days	Fri 8/05/26
30		Reservoir leak test	30 days	Sat 9/05/26
31		Reservoir testing and commissioning	60 days	Mon 15/06/26
32		**Valvehouse Construction**	**305 days**	**Tue 3/06/25**
33		Valve house - stage 1 (below ground level)	25 days	Tue 3/06/25
34		Valve house - stage 2 and mech install	20 days	Thu 9/04/26
35		Electrical, ventilation install in valve house	30 days	Mon 4/05/26
36		**Landscaping and Reinstatement**	**85 days**	**Sat 9/05/26**
37		Cut to waste off-site - 6,000m3	15 days	Sat 9/05/26
38		Reinstatement of fire-break track	30 days	Tue 26/05/26
39		Planting and landscaping	40 days	Thu 2/07/26
40		Contractor's float	40 days	Sat 22/08/26
41		Project complete	0 days	Wed 7/10/26

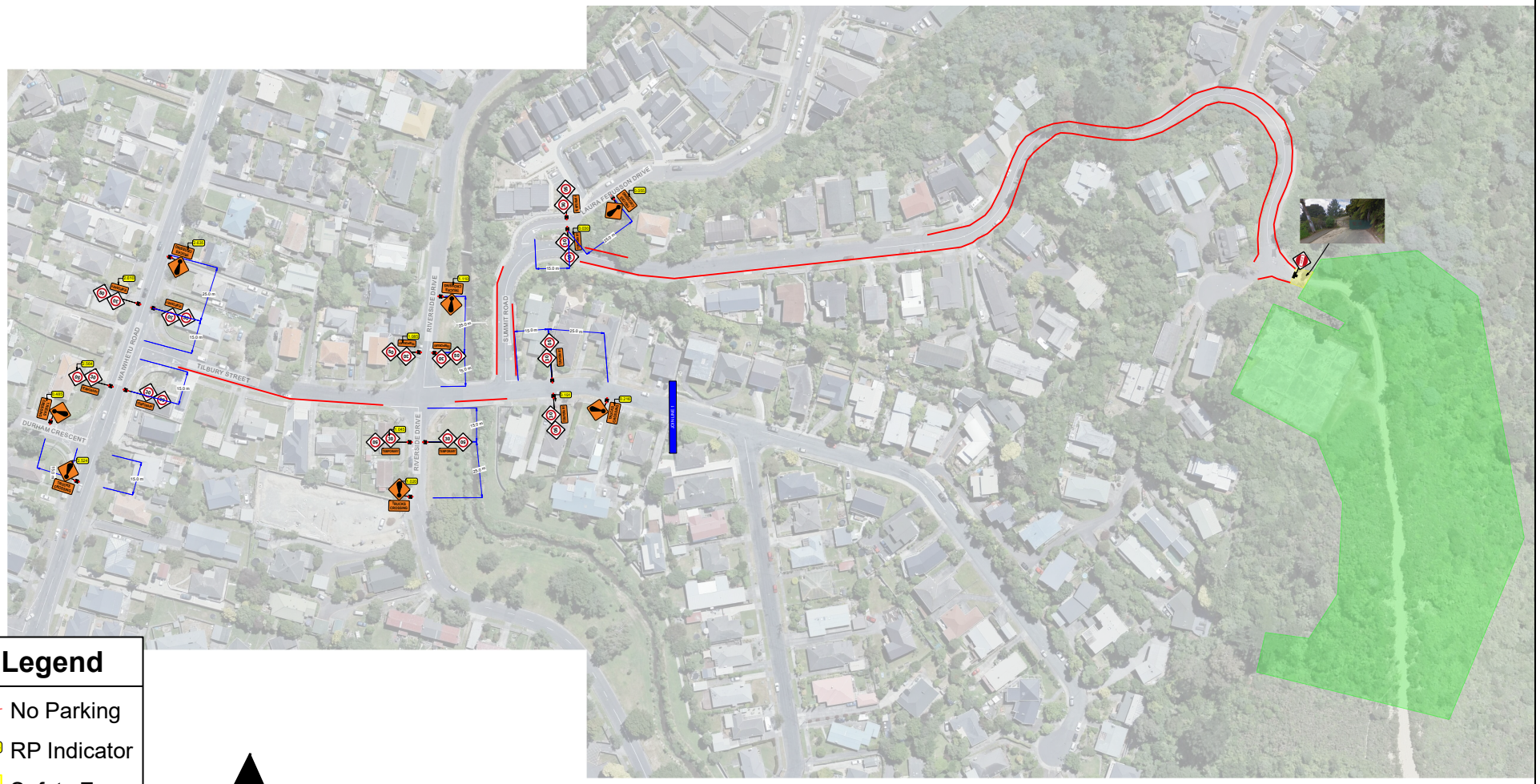


Project: Eastern Hills Reservoir C
Date: Fri 25/08/23

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

Appendix B
TMP Diagrams

Full TTM setup for regular Truck movements
No Parking to allow trucks to traverse through streets safely



Legend

- No Parking
- RP Indicator
- Safety Zone
- Sign Stand
- Work Area

Plan	*1*	Site Overview	
Designer	Matt Smits	42790	STMS CAT ABC-NP
Date	16/05/2023		

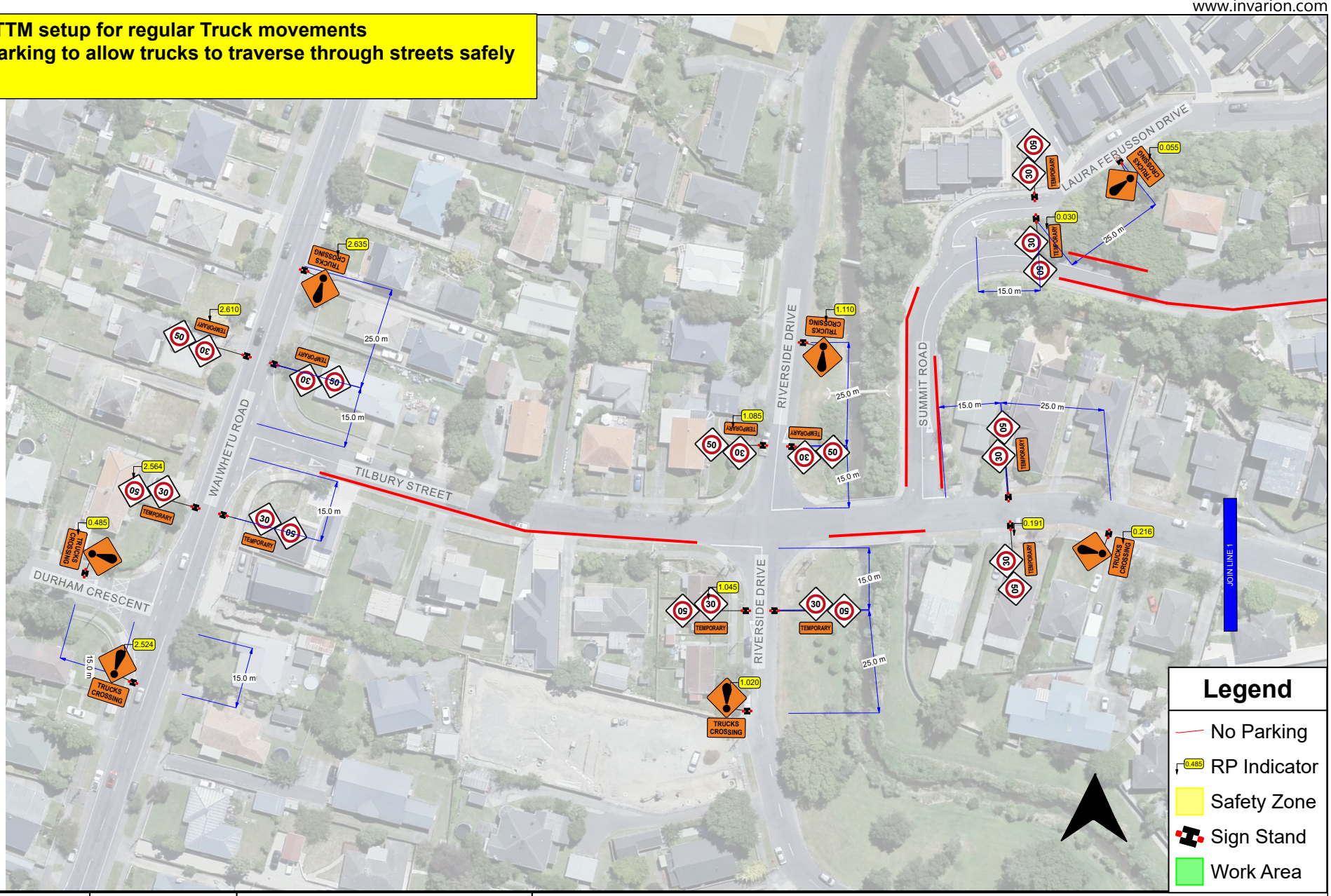
Stay Safe

Living Safely
People at the heart of everything

Plan Scale

1 : 2705 (1cm = 27m)

Full TTM setup for regular Truck movements
No Parking to allow trucks to traverse through streets safely



Plan	2	Western Approach	
Designer	Matt Smits	42790	STMS CAT ABC-NP
Date	16/05/2023		

Stay Safe

Fulton Hogan Living Safely
People at the heart of everything

Plan Scale

1 : 1287 (1cm = 13m)

Full TTM setup for regular Truck movements
No Parking to allow trucks to traverse through streets safely

Plan	*3*	Eastern and work area	
Designer	Matt Smits	42790	STMS CAT ABC-NP
Date	16/05/2023		

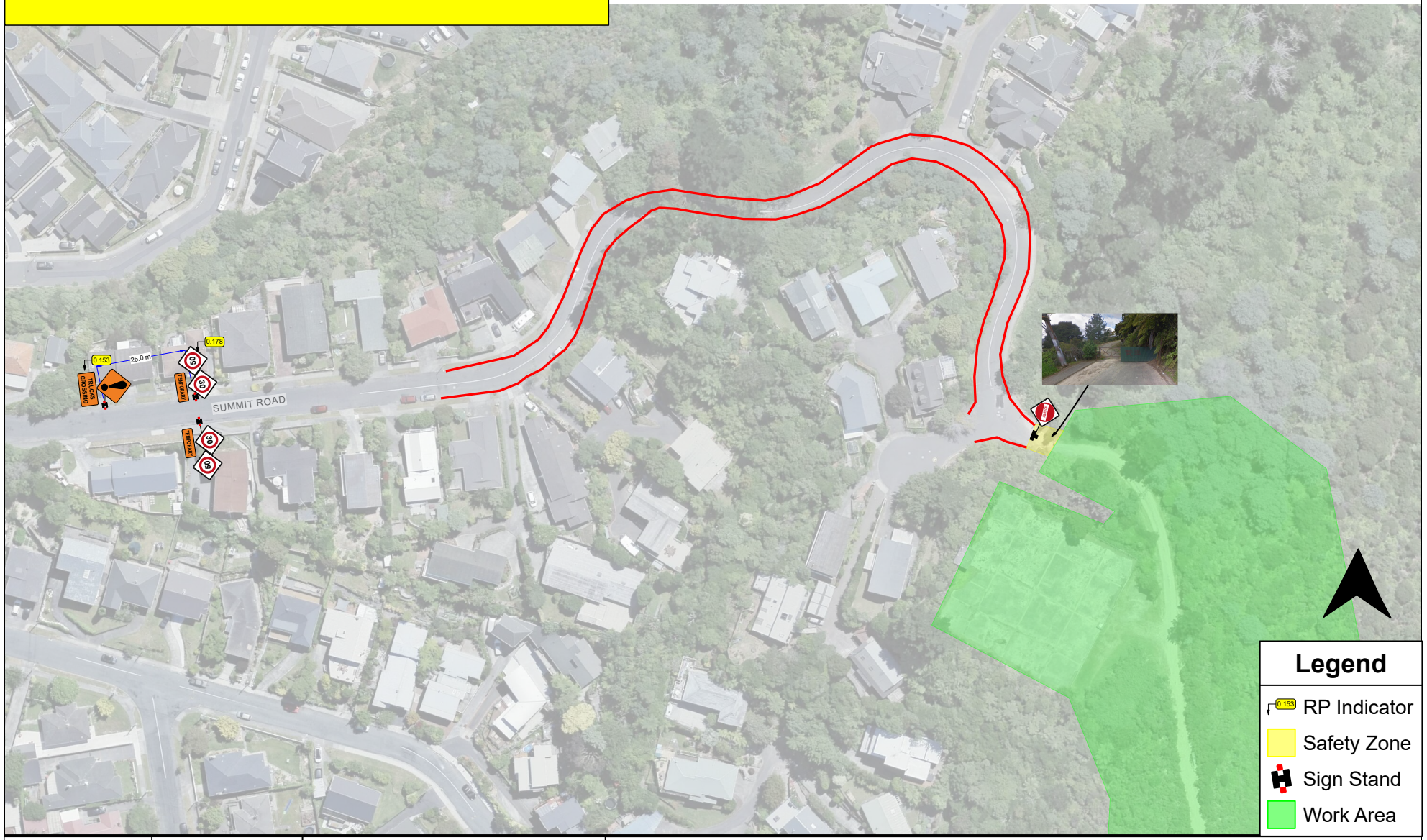
Stay Safe

Fulton Hogan Living Safely
People at the heart of everything

Plan Scale

1 : 1878 (1cm = 19m)

TTM setup for minor Truck movements and small plant
No Parking to allow trucks to traverse through streets safely



Plan	*4*	Minor movements	
Designer	Matt Smits	42790	STMS CAT ABC-NP
Date	16/05/2023		

Stay Safe

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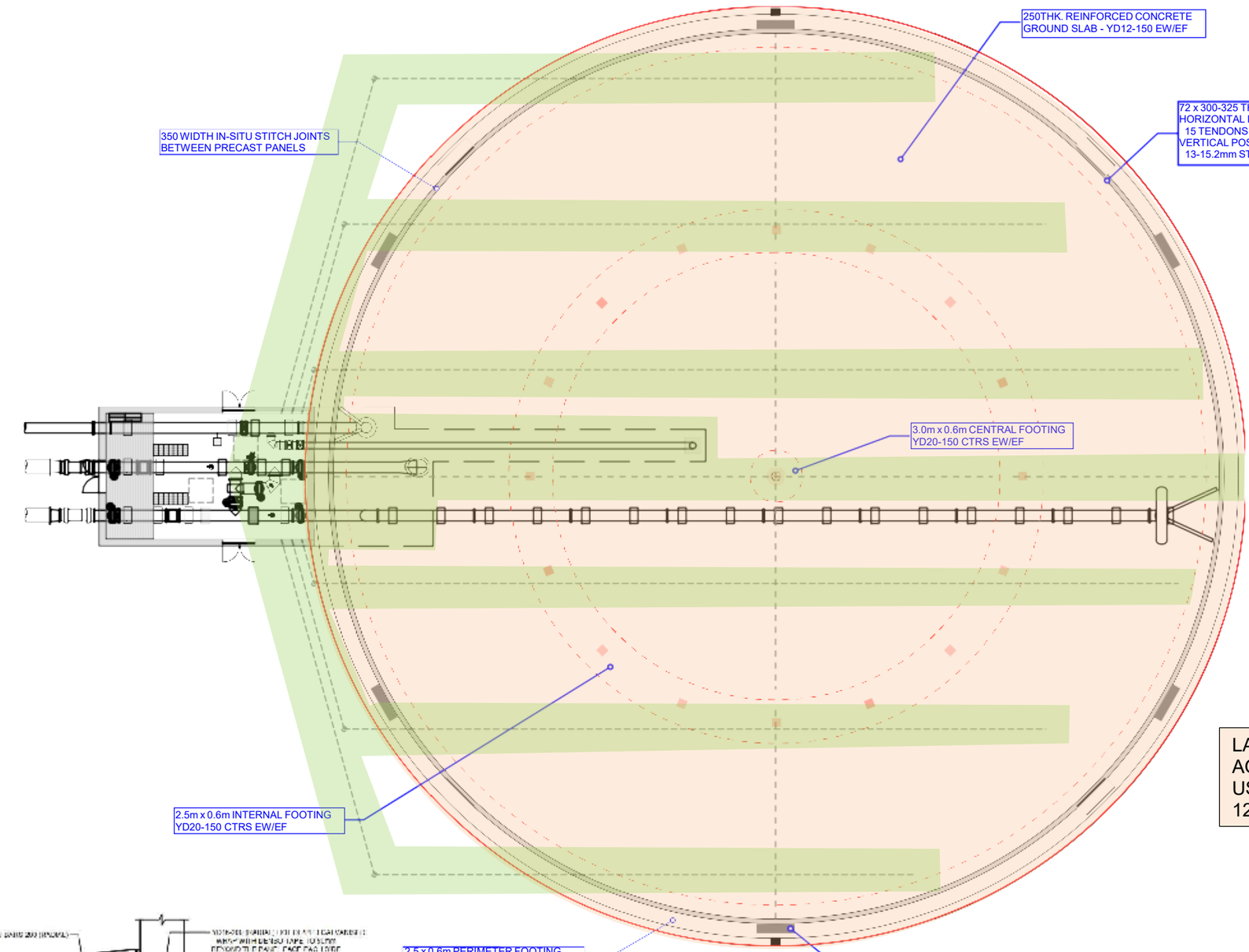
People at the heart of everything

Plan Scale

1 : 1518 (1cm = 15m)

Appendix C
Reservoir Construction Sequence Plans



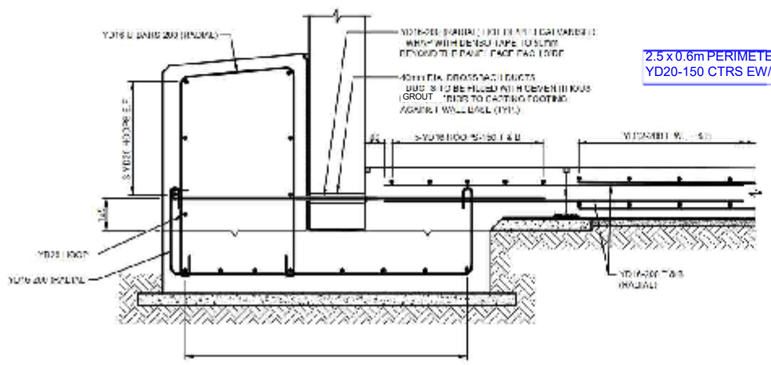
PLAN
Scale: 1:150

1 – CUT TO BASE OF GRAVEL RAFT

2 – LOCALLY TRENCH FOR INSTALLATION OF INLET PIPE, OUTLET/DRAIN PIPE, AND SUB-SOIL DRAINS

3 – INSTALL INLET AND OUTLET PIPEWORK WITH CRANE SITTING ON EXTERIOR CRANE PAD. INSTALL SUB SOIL DRAINAGE WITH LIGHT MACHINERY. BACKFILL AND COMPACT ALL TRENCHES AS REQUIRED TO THE BOTTOM OF GRAVEL FOUNDATION

LAY AND COMPACT AGGREGATE FOUNDATION USING 20T EXCAVATOR AND 12T ROLLER



NOTES:

1. STRUCTURES SHOWN INDICATIVELY

0 1 2 3 4m
SCALE 1:150 AT ORIGINAL SIZE

GENERAL ARRANGEMENT AND DETAILS SHOWN ARE CONCEPT LEVEL ONLY, SHOWN TO PROVIDE THE DESIGN INTENT. PROJECT SPECIFIC DESIGN AND DOCUMENTATION HAS NOT BEEN CARRIED OUT.

ORIGINAL DRAWING IN COLOUR

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED WITH CONCEPT DESIGN - FINAL	BLC	LT	MS	3/03/23
0	ISSUED FOR INFORMATION	BLC	LT	MS	7/12/22

Drawing Originator
Connect Water
c/- Opus International Consultants Ltd
PO box 12 003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1)	AS SHOWN
Reduced Scale (A3)	1/2 SHOWN
Design	BLC
Drawn	BLC
Dsg Verifier	LT
Dwg Check	L.H.

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
NAENAE NO.2 RESERVOIR

Title: RESERVOIR & VALVEHOUSE
GENERAL ARRANGEMENT - GROUND LEVEL

Discipline: STRUCTURAL
Drawing No.: 3-WW021.02_S001
Rev.: 1

Plotted By: Birdling, Greg

DO NOT SCALE - IF IN DOUBT ASK

Drawing Plotted: 08 Nov 2022 7:21 AM

Document Path: \\CORP.PBWAN.NET\ANZ\PROJECTS\NZ3W3-WW\021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

Document No.: NAENAE 2 CONCEPT DESIGN RPREWORK.DWG

A1 REPRODUCTION SCALE
100 80 60 40 20 0mm

A3 REPRODUCTION SCALE
50 40 30 20 10 0mm

LEAVE SECTION TILL LAST FOR TELEHANDLER ENTRY

250THK. REINFORCED CONCRETE GROUND SLAB - YD12-150 EW/EF

72 x 300-325 THK. PRECAST POST-TENSIONED WALL PANELS - f'c = 65MPa HORIZONTAL POST-TENSIONING:
15 TENDONS / 12-15.2mm STRANDS LOCATED CENTRAL
VERTICAL POST-TENSIONING:
13-15.2mm STRANDS EACH FACE

350 WIDTH IN-SITU STITCH JOINTS BETWEEN PRECAST PANELS

3.0m x 0.6m CENTRAL FOOTING YD20-150 CTRS EW/EF

2.5m x 0.6m INTERNAL FOOTING YD20-150 CTRS EW/EF

2.5 x 0.6m PERIMETER FOOTING YD20-150 CTRS EW/EF

6 x 750THK. x 1.6m WIDE PRECAST PRESTRESSED PILASTERS, EQUALLY SPACED AROUND RESERVOIR PERIMETER
VERTICAL POST-TENSIONING:
13-15.2mm STRANDS EACH FACE

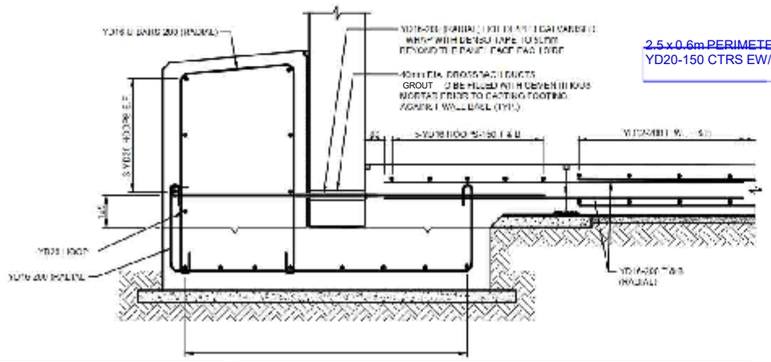
PLAN
Scale: 1:150

1 – LOCALLY EXCAVATE CIRCULAR FOOTINGS AND COMPACT AGGREGATE AT BASE OF FOOTINGS

2 - TIE FOOTING REINFORCING. TELEHANDLER TO DISTRIBUTE BARS. BOX 100MM ABOVE GRAVEL FOUNDATION LEVEL

3 – POUR FOOTINGS USING 65M CONCRETE PUMP. CONCRETE TRUCKS WILL USE THE TRUCK TURNING CIRCLE AND BACK UP TO THE PUMP. NOTE, ADDITIONAL COST OF 65M PUMP WILL BE OUTWEIGHED BY INCREASED EFFICIENCY POURING ALL FOOTINGS TOGETHER. CREATE CONSTRUCTION JOINT WITH RIUGISOL APPLIED IMMEDIATELY AFTER POUR

FOLLOWING FOOTINGS, POUR 100MM OF SITE CONCRETE ON ALL AREAS OTHER AREAS. SITE CONCRETE WILL BE LEVEL WITH THE TOP OF FOOTINGS



NOTES:

1. STRUCTURES SHOWN INDICATIVELY

0 1 2 3 4m

GENERAL ARRANGEMENT AND DETAILS SHOWN ARE CONCEPT LEVEL ONLY, SHOWN TO PROVIDE THE DESIGN INTENT. PROJECT SPECIFIC DESIGN AND DOCUMENTATION HAS NOT BEEN CARRIED OUT.

ORIGINAL DRAWING IN COLOUR

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED WITH CONCEPT DESIGN - FINAL	BLC	LT	MS	3/03/23
0	ISSUED FOR INFORMATION	BLC	LH	MS	7/12/22

Drawing Originator: Connect Water
c/- Opus International Consultants Ltd
PO box 12 003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1): AS SHOWN
Reduced Scale (A3): 1/2 SHOWN
* Refer to Revision 1 for Original Signature

		Approved For Construction*
Design	BLC	
Drawn	BLC	
Dsg Verifier	LT	
Dwg Check	LH	Date

Client: Wellington Water

Project: WELLINGTON WATER
NAENAE NO.2 RESERVOIR

Title: RESERVOIR & VALVEHOUSE
GENERAL ARRANGEMENT - GROUND LEVEL

Discipline: STRUCTURAL

Drawing No.: 3-WW021.02_S001

Rev.: 1

Plotted By: Birdling, Greg

DO NOT SCALE - IF IN DOUBT ASK

Drawing Plotted: 08 Nov 2022 7:21 AM

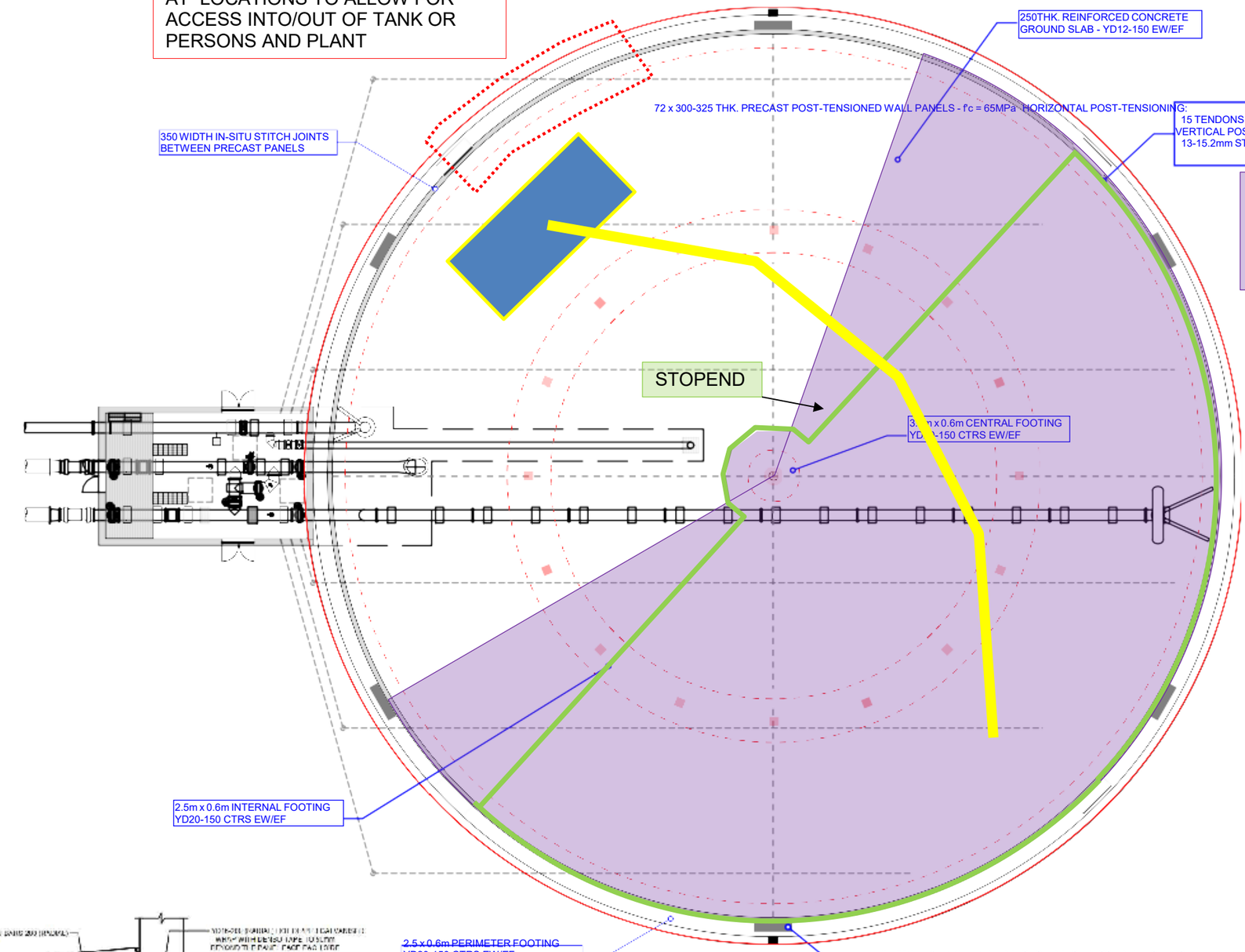
Document Path: \\CORP.PBWAN.NET\ANZ\PROJECTS\NZ3\W3-WW\021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

Document No. NAENAE 2 CONCEPT DESIGN PIPEWORK.DWG

A1 REPRODUCTION SCALE: 100 80 60 40 20 0mm

A3 REPRODUCTION SCALE: 50 40 30 20 10 0mm

INSALL RIED BAR COUPLERS TO VERTICAL STARTERS IN FOOTINGS AT LOCATIONS TO ALLOW FOR ACCESS INTO/OUT OF TANK OR PERSONS AND PLANT

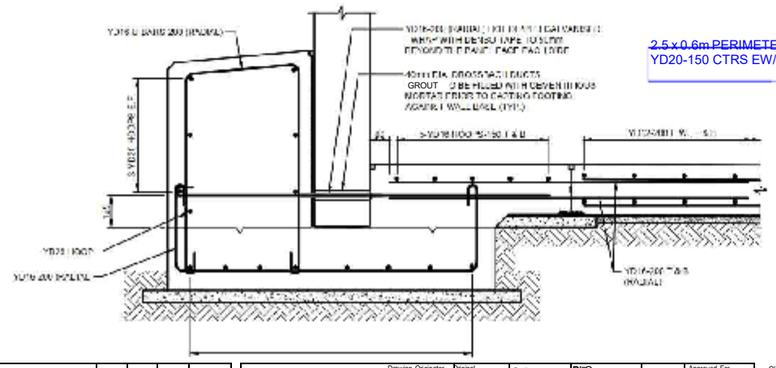


PLAN
Scale: 1:150

1 - SETOUT AND TIE REINFORCING MAT. WORK FROM SOUTH TO NORTH TO ALLOW FOR PLACEMENT OF REBAR

2 – INSTALL ~300MM HIGH FORMWORK AROUND PERIMETER OF TANK

3 – POUR FOOTINGS USING 65M CONCRETE PUMP. CONCRETE TRUCKS WILL USE THE TRUCK TURNING CIRCLE AND BACK UP TO THE PUMP. NOTE, ADDITIONAL COST OF 65M PUMP WILL BE OUTWEIGHED BY INCREASED EFFICIENCY POURING ALL FOOTINGS TOGETHER. CREATE CONSTRUCTION JOINT WITH RIUGISOL APPLIED IMMEDIATELY AFTER POUR



NOTES:

1. STRUCTURES SHOWN INDICATIVELY

0 1 2 3 4m

GENERAL ARRANGEMENT AND DETAILS SHOWN ARE CONCEPT LEVEL ONLY, SHOWN TO PROVIDE THE DESIGN INTENT. PROJECT SPECIFIC DESIGN AND DOCUMENTATION HAS NOT BEEN CARRIED OUT.

ORIGINAL DRAWING IN COLOUR

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED WITH CONCEPT DESIGN - FINAL	BLC	LT	MS	3/03/23
0	ISSUED FOR INFORMATION	BLC	LH	MS	7/12/22

Drawing Originator: Connect Water
c/- Opus International Consultants Ltd
PO box 12 003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1): AS SHOWN
Reduced Scale (A3): 1/2 SHOWN

Design	BLC
Drawn	BLC
Dsg Verifier	LT
Dwg Check	L.H.

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
NAENAE NO.2 RESERVOIR

Title: RESERVOIR & VALVEHOUSE
GENERAL ARRANGEMENT - GROUND LEVEL

Discipline: STRUCTURAL
Drawing No.: 3-WW021.02_S001
Rev: 1

Plotted By: Birdling, Greg

DO NOT SCALE - IF IN DOUBT ASK

Drawing Plotted: 08 Nov 2022 7:21 AM

A1 REPRODUCTION SCALE: 100 80 60 40 20 0mm
A3 REPRODUCTION SCALE: 50 40 30 20 10 0mm

Document Path: \\CORP.PBWAN.NET\ANZ\PROJECTS\NZ3\W3-WW021\02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS
Document No.: NAENAE.2 CONCEPT DESIGN PIPEWORK.DWG

INDICATIVE CRANE PAD EXTENT

PANEL DELIVERY TRUCK PATH

250THK. REINFORCED CONCRETE GROUND SLAB - YD12-150 EW/EF

72 x 300-325 THK. PRECAST POST-TENSIONED WALL PANELS - f'c = 65MPa HORIZONTAL POST-TENSIONING:

15 TEN
POST-TE
13-15.2

350 WIDTH IN-SITU STITCH JOINTS BETWEEN PRECAST PANELS

CRANE

3.0m x 0.6m CENTRAL FOOTING
YD20-150 CTRS EW/EF

2.5m x 0.6m INTERNAL FOOTING
YD20-150 CTRS EW/EF

2.5 x 0.6m PERIMETER FOOTING
YD20-150 CTRS EW/EF

6 x 750THK. x 1.6m WIDE PRECAST PRESTRESSED PILASTERS, EQUALLY SPACED AROUND RESERVOIR PERIMETER
VERTICAL POST-TENSIONING:
13-15.2mm STRANDS EACH FACE

PLAN
Scale: 1:150

1 – LAY AND COMPACT CRUSHED AGGREGATE ON TOP OF FOUNDATION SLAB TO ACT AS A CRANE PAD. THIN LAYER OF PLY WOOD OR SIMILAR MAY BE REQUIRED TO PROTECT CONCRETE FINISH.

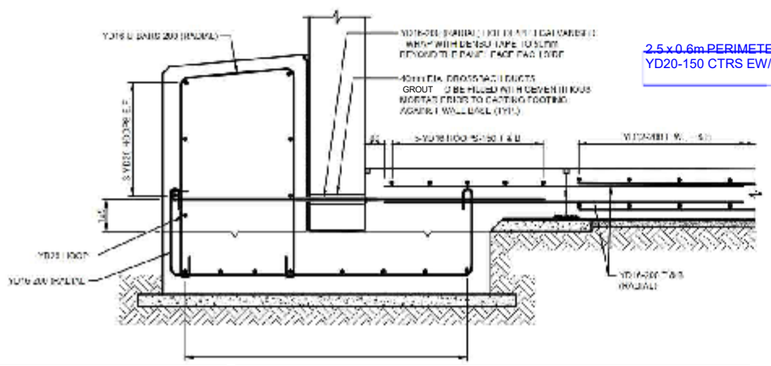
2 – UNLOAD PANELS DIRECTLY FROM TRUCK, STAND IN PLACE, AND SECURE PROPS

3 – INSTALL HYDROPHILIC SEALANT, REINFORCING, DIVVY CONDUITS, AND DROSSBACH COUPLERS TO STITCH JOINTS.

INSTALL FORMWORK AND DIVVY BARS.

POUR CONCRETE FROM PUMP, AND VIBRATE USING COMBINATION OF STICK AND WALL VIBRATORS.

WORK AROUND PERIMETER OF TANK IN BOTH DIRECTIONS. PROPS REMAIN IN PLACE UNTIL POST TENSIONING IS COMPLETE



NOTES:

1. STRUCTURES SHOWN INDICATIVELY

0 1 2 3 4m

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ORIGINAL DRAWING IN COLOUR

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1	ISSUED WITH CONCEPT DESIGN - FINAL	BLC	LT	MS	3/03/23
0	ISSUED FOR INFORMATION	BLC	LH	MS	7/12/22

1 000 x 600 REINFORCED CONCRETE TAPERED BEAM
4YD32 TOP & BTM, YD16 STIRRUPS @ 200 CTRS

Drawing Originator: Connect Water Limited, PO box 12 003 Thorndon, Wellington 6144, T 64 4 471 7000
Original Size: A1
Reduced Scale (A3): 1/2 SHOWN
* Refer to Revision 1 for Original Signature

		Approved For Construction*
Design	BLC	
Drawn	BLC	
Dwg Verifier	LT	
Dwg Check	LH	Date

Client: Wellington Water

Project: WELLINGTON WATER
NAENAE NO.2 RESERVOIR

Title: RESERVOIR & VALVEHOUSE
GENERAL ARRANGEMENT - GROUND LEVEL

Discipline: STRUCTURAL

Drawing No.: 3-WW021.02_S001

Rev.: 1

68 No. PRECAST PRESTRESSED TAPERING TEE-BEAMS 500 DEEP - WIDTH VARIES

PRECAST PRESTRESSED TAPERING TEE-BEAMS 500 DEEP - WIDTH VARIES

Plotted By: Birdling, Greg

DO NOT SCALE - IF IN DOUBT ASK

Drawing Plotted: 08 Nov 2022 7:21 AM

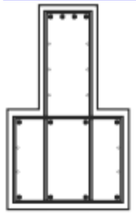
A1 REPRODUCTION SCALE: 100 80 60 40 20 0mm

A3 REPRODUCTION SCALE: 50 40 30 20 10 0mm

Document Path: \\CORP.PBWAN.NET\ANZ\PROJECTS\NZ\3W3-WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

Document No.: NAENAE2 CONCEPT DESIGN.RIPBDWORK.DWG

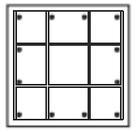
1000 x 600 REINFORCED CONCRETE BEAM
4YD32 TOP & BTM + YD16 STIRRUPS-200 CTRS

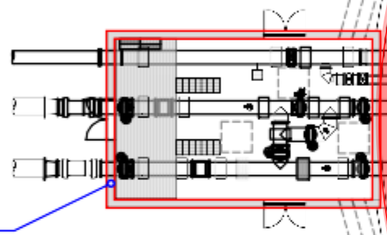


INSTALL WALL PANELS, INFILLS ROOF BEAMS AND ROOF PANELS WITH CRANE ON EXTERIOR. AFTER RED AREA ALL COMPLETE

LEAVE OPEN FOR CRANE ACCESS IN AND OUT OF THE TANK AND FOR INSTALLING THE ROOFING ELEMENTS

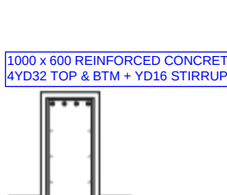
13 x 600SQ INTERNAL COLUMNS
4 x YD20 EF + YD12 TIES-150 CTRS





400THK REINFORCED CONCRETE
WALLS & BASE SLAB - YD16-150 EW/EF

1 x 1000DIA CENTRAL COLUMN
16 x YD20 + YD12 TIES-150 CTRS

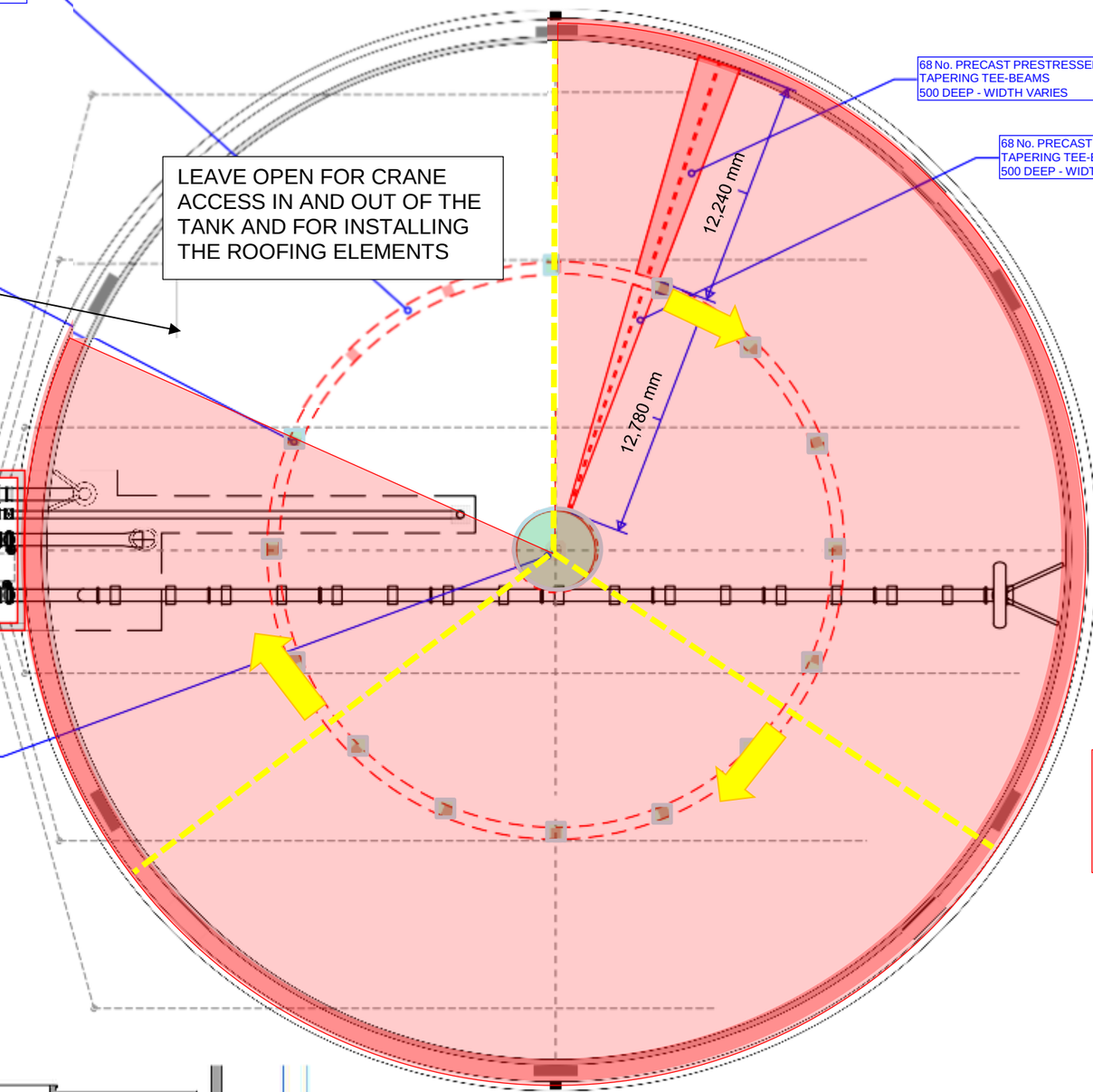


68 No. PRECAST PRESTRESSED
TAPERING TEE-BEAMS
500 DEEP - WIDTH VARIES

68 No. PRECAST PRESTRESSED
TAPERING TEE-BEAMS
500 DEEP - WIDTH VARIE

12,240 mm

12,780 mm



1 –TIE REINFORCING FOR COLUMNS, INSTALL FORMWORK AND POUR. LEAVE TWO COLUMNS TILL THE END AS SHOWN

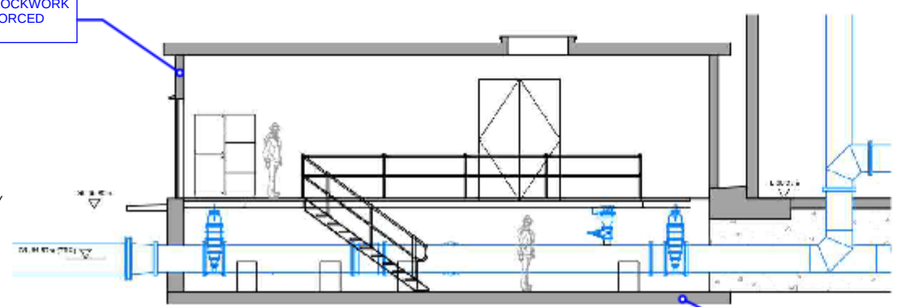
2 - INSTALL ALL OUTER PRECAST ROOF BEAM ELEMENTS

3 - INSTALL ALL INNER PRECAST ROOF BEAM ELEMENTS

4 - INSTALL PRECAST ROOF PANELS IN A “PEACE” SIGN TO ENSURE EVEN LOADING ON THE CENTRAL COLUMN

PLAN
Scale: 1:150

200 SERIES REINFORCED BLOCKWORK
WALLS SUPPORTING REINFORCED
CONCRETE ROOF



400THK REINFORCED CONCRETE
WALLS & BASE SLAB - YD16-150 EW/EF

NOTES:

1. STRUCTURES SHOWN INDICATIVELY

0 1 2 3 4m
SCALE 1:150 AT ORIGINAL SIZE

GENERAL ARRANGEMENT AND DETAILS SHOWN ARE CONCEPT LEVEL ONLY, SHOWN TO PROVIDE THE DESIGN INTENT. PROJECT SPECIFIC DESIGN AND DOCUMENTATION HAS NOT BEEN CARRIED OUT.

ORIGINAL DRAWING IN COLOUR

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED WITH CONCEPT DESIGN - FINAL	BLC	LT	MS	3/03/23
0	ISSUED FOR INFORMATION	BLC	LT	MS	7/12/22

Drawing Originator: Connect Water
c/- Opus International Consultants Ltd
PO box 12 003 Thorndon
Wellington 6144
T 64 4 471 7000

Original sheet size (A1) is A1 SHOWN
Reduced sheet size (A3) is 1/2 SHOWN

Design	BLC	
Drawn	BLC	
Dsg Verifier	LT	
Dwg Check	L.H.	

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
NAENAE NO.2 RESERVOIR

Title: RESERVOIR & VALVEHOUSE
GENERAL ARRANGEMENT - ROOF LEVEL

Discipline: STRUCTURAL

Drawing No.: 3-WW021.02 _:S002

Rev.: 1

Document No.: NAENAE 2 CONCEPT DESIGN RPBWORK.DWG

Document Path: \\CORP.PBWAN.NET\ANZ\PROJECTS\NZ3W3-WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

Plotted By: Birdling, Greg

DO NOT SCALE - IF IN DOUBT ASK

Drawing Plotted: 08 Nov 2022 7:21 AM

A1 REPRODUCTION SCALE
100 80 60 40 20 0mm

A3 REPRODUCTION SCALE
50 40 30 20 10 0mm

Appendix D
Construction Layouts

Drawing Number	Title	Revision
3-WW021.02_C009	Construction Methodology – Site Layout	1
3-WW021.02_C010	Construction Methodology – Concrete Pours	1
3-WW021.02_C011	Construction Methodology – Crane Locations	1
3-WW021.02_C012	Construction Methodology – Balgownie Grove	1
3-WW021.02_C013	Construction Methodology – Scour and Delivery Pipes	1
3-WW021.02_C015	Construction Methodology – Temporary Staging Bridge - Concept	1

NOTES:

1. DO NOT SCALE OFF DRAWINGS.
2. MAJOR EROSION AND SEDIMENT CONTROL DEVICES ONLY SHOWN. REFER TO DRAWING C014 FOR THE EROSION AND SEDIMENT CONTROL PLAN.

LEGEND

- PERIMETER FENCING
- PERIMETER FENCING & 3m HIGH NOISE BARRIER
- IMPACT BARRIER
- SITE OFFICE & FACILITIES
- MATERIAL LAYDOWN
- SITE CAR PARKING
- SEDIMENT RETENTION PONDS

A1 REPRODUCTION SCALE
0 5 10 15 20 25 30 35
SCALE 1:750 AT ORIGINAL SIZE (A1)
A3 REPRODUCTION SCALE
0mm 10 20 30 40 50 60 80 100

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED TO WWL	R.P.	J.D.	J.L.	24/11/23
0	ISSUED FOR INFORMATION	R.P.	J.L.	J.L.	29/09/23

Drawing Originator: Connect Water
Connect Water
c/- WSP
PO Box 12-003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1) 1:750
Reduced Scale (A3) 1:1500

Design	L.H.	24/11/23	Approved For Construction*
Drawn	R.P	24/11/23	-
Dsg Verifier	J.D	24/11/23	
Dwg Check	J.D	24/11/23	Date-

* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
EASTERN HILLS RESERVOIR

Title: CONSTRUCTION METHODOLOGY
SITE LAYOUT

Discipline: CIVIL
Drawing No.: 3-WW021.02_C009
Rev.: 1

DOCUMENT PATH: \\CORP\ANZ\PROJECTS\NZ3W3-WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS
DOCUMENT NO: 3-WW021.02_C009.DWG

PLOTTED BY: PIETERSEN, RIAAN

DO NOT SCALE - IF IN DOUBT ASK

DRAWING PLOTTED: 27-Jul-23

NOTES:

1. DO NOT SCALE OFF DRAWINGS.
2. MAJOR EROSION AND SEDIMENT CONTROL DEVICES ONLY SHOWN. REFER TO DRAWING C014 FOR THE EROSION AND SEDIMENT CONTROL PLAN.

LEGEND

- PERIMETER FENCING
- PERIMETER FENCING & 3m HIGH NOISE BARRIER
- IMPACT BARRIER
- SITE OFFICE & FACILITIES
- MATERIAL LAYDOWN
- SITE CAR PARKING
- CONTAINED CONCRETE
- WASHDOWN AREA
- SEDIMENT RETENTION PONDS

A1 REPRODUCTION SCALE: 0mm 20 40 60 80 100

A3 REPRODUCTION SCALE: 0mm 10 20 30 40 50

0 5 10 15 20 25 30 35

SCALE 1:750 AT ORIGINAL SIZE (A1)

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED TO WWL	R.P.	J.D.	J.L.	24/11/23
0	ISSUED FOR INFORMATION	R.P.	J.L.	J.L.	29/09/23

Drawing Originator: Connect Water
c/- WSP
PO Box 12-003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1) 1:750
Reduced Scale (A3) 1:1500

Design	L.H.	24/11/23	Approved For Construction*
Drawn	R.P.	24/11/23	-
Dsg Verifier	J.D.	24/11/23	
Dwg Check	J.D.	24/11/23	Date-

* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
EASTERN HILLS RESERVOIR

Title: CONSTRUCTION METHODOLOGY
CONCRETE POURS

Discipline: CIVIL

Drawing No.: 3-WW021.02_C010

Rev.: 1

DOCUMENT PATH: \\CORPIANZ\PROJECTSNZ\3WS\WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

DOCUMENT NO: 3-WW021.02_C010.DWG

PLOTTED BY: PIETERSEN, RIAAN

DO NOT SCALE - IF IN DOUBT ASK

DRAWING PLOTTED: 27-Jul-23

NOTES:

1. DO NOT SCALE OFF DRAWINGS.
2. MAJOR EROSION AND SEDIMENT CONTROL DEVICES ONLY SHOWN. REFER TO DRAWING C014 FOR THE EROSION AND SEDIMENT CONTROL PLAN.

LEGEND

- PERIMETER FENCING
- PERIMETER FENCING & 3m HIGH NOISE BARRIER
- IMPACT BARRIER
- SITE OFFICE & FACILITIES
- MATERIAL LAYDOWN
- SITE CAR PARKING
- SEDIMENT RETENTION PONDS

A1 REPRODUCTION SCALE
0mm 20 40 60 80 100

A3 REPRODUCTION SCALE
0mm 10 20 30 40 50

0 5 10 15 20 25 30 35
SCALE 1:750 AT ORIGINAL SIZE (A1)

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED TO WWL	R.P.	J.D.	J.L.	24/11/23
0	ISSUED FOR INFORMATION	R.P.	J.L.	J.L.	29/09/23

Drawing Originator: Connect Water
c/- WSP
PO Box 12-003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1) 1:750
Reduced Scale (A3) 1:1500

Design	L.H.	24/11/23	Approved For Construction*
Drawn	R.P.	24/11/23	
Dsg Verifier	J.D.	24/11/23	
Dwg Check	J.D.	24/11/23	Date-

* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
EASTERN HILLS RESERVOIR

Title: CONSTRUCTION METHODOLOGY
CRANE LOCATIONS

Discipline: CIVIL

Drawing No.: 3-WW021.02_C011

Rev.: 1

DOCUMENT PATH: \\CORP\ANZ\PROJECTS\NZ3W3-WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

DOCUMENT NO: 3-WW021.02_C011.DWG

PLOTTED BY: PIETERSEN, RIAAN

DO NOT SCALE - IF IN DOUBT ASK

DRAWING PLOTTED: 27-Jul-23

NOTES:

1. DO NOT SCALE OFF DRAWINGS.
2. MAJOR EROSION AND SEDIMENT CONTROL DEVICES ONLY SHOWN. REFER TO DRAWING C014 FOR THE EROSION AND SEDIMENT CONTROL PLAN.
3. SITE FENCING ON THE DOWNHILL SECTION TO BE LOCATED AT THE EDGE OF THE WORK AREA WHERE IT IS SAFE AND PRACTICAL TO DO SO.
4. SECTION OF NOISE BARRIER PERPENDICULAR TO STREAM FLOW IS TO BE EASILY REMOVABLE IN THE EVENT A HEAVY RAIN FALL IS PREDICTED.
5. FENCING LOCATED IN THE FLOOD PLAIN IS TO BE EASILY REMOVABLE IN THE EVENT A HEAVY RAIN FALL IS PREDICTED.
6. REFER TO DRAWING 3WW021.02_C015 FOR THE TEMPORARY STAGING BRIDGE.

LEGEND

- PERIMETER FENCING
- SHEET PILED COFFERDAM
- 10m WETLAND BUFFER
- 2.0m LOCALISED NOISE SCREENS
- WETLAND (CONFIRMED)
- SITE OFFICE & FACILITIES
- DECANTING EARTH BUND
- MATERIAL LAYDOWN
- LAMELLA SEDIMENT TANK FOR DEWATERING
- PUMP / GENERATOR LOCATION

A1 REPRODUCTION SCALE
0mm 20 40 60 80 100

A3 REPRODUCTION SCALE
0mm 10 20 30 40 50

0 2.5 5 7.5 10 12.5
SCALE 1:250 AT ORIGINAL SIZE (A1)

0 5 10 15 20 25
SCALE 1:500 AT ORIGINAL SIZE (A3)

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED TO WWL	R.P.	J.D.	J.L.	24/11/23
0	ISSUED FOR INFORMATION	R.P.	J.D.	J.L.	29/09/23

Drawing Originator
Connect Water
c/- WSP
PO Box 12-003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1) 1:250
Reduced Scale (A3) 1:500

Design	L.H.	24/11/23	Approved For Construction* - Date-
Drawn	R.P.	24/11/23	
Dsg Verifier	J.D.	24/11/23	
Dwg Check	J.D.	24/11/23	

* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
EASTERN HILLS RESERVOIR

Title: CONSTRUCTION METHODOLOGY
BALGOWNIE GROVE

Discipline: CIVIL

Drawing No.: 3-WW021.02_C012

Rev.: 1

DOCUMENT PATH: \\CORP\ANZ\PROJECTS\NZ3\W3-WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS

DOCUMENT NO.: 3-WW021.02_C012.DWG

PLOTTED BY: PIETERSEN, RIAAN

DO NOT SCALE - IF IN DOUBT ASK

DRAWING PLOTTED: 27-Jul-23

NOTES:

1. DO NOT SCALE OFF DRAWINGS.
2. MAJOR EROSION AND SEDIMENT CONTROL DEVICES ONLY SHOWN. REFER TO DRAWING C014 FOR THE EROSION AND SEDIMENT CONTROL PLAN.
3. SITE FENCING ON THE DOWNHILL SECTION TO BE LOCATED AT THE EDGE OF THE WORK AREA WHERE IT IS SAFE AND PRACTICAL TO DO SO.

LEGEND

- PERIMETER FENCING
- PERIMETER FENCING & 3m HIGH NOISE BARRIER
- IMPACT BARRIER
- SITE OFFICE & FACILITIES
- MATERIAL LAYDOWN
- SITE CAR PARKING
- SEDIMENT RETENTION PONDS
- DECANTING EARTH BUND

A1 REPRODUCTION SCALE
0mm 20 40 60 80 100

A3 REPRODUCTION SCALE
0mm 10 20 30 40 50

0 5 10 15 20 25 30 35
SCALE 1:750 AT ORIGINAL SIZE (A1)

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED TO WWL	R.P.	J.D.	J.L.	24/11/23
0	ISSUED FOR INFORMATION	R.P.	J.L.	J.L.	29/09/23

Drawing Originator: Connect Water
c/- WSP
PO Box 12-003 Thorndon
Wellington 6144
T 64 4 471 7000

Original Scale (A1) 1:750
Reduced Scale (A3) 1:1500

Design	L.H.	24/11/23	Approved For Construction*
Drawn	R.P	24/11/23	-
Dsg Verifier	J.D	24/11/23	
Dwg Check	J.D	24/11/23	Date-

* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
EASTERN HILLS RESERVOIR

Title: CONSTRUCTION METHODOLOGY
SCOUR AND DELIVERY PIPES

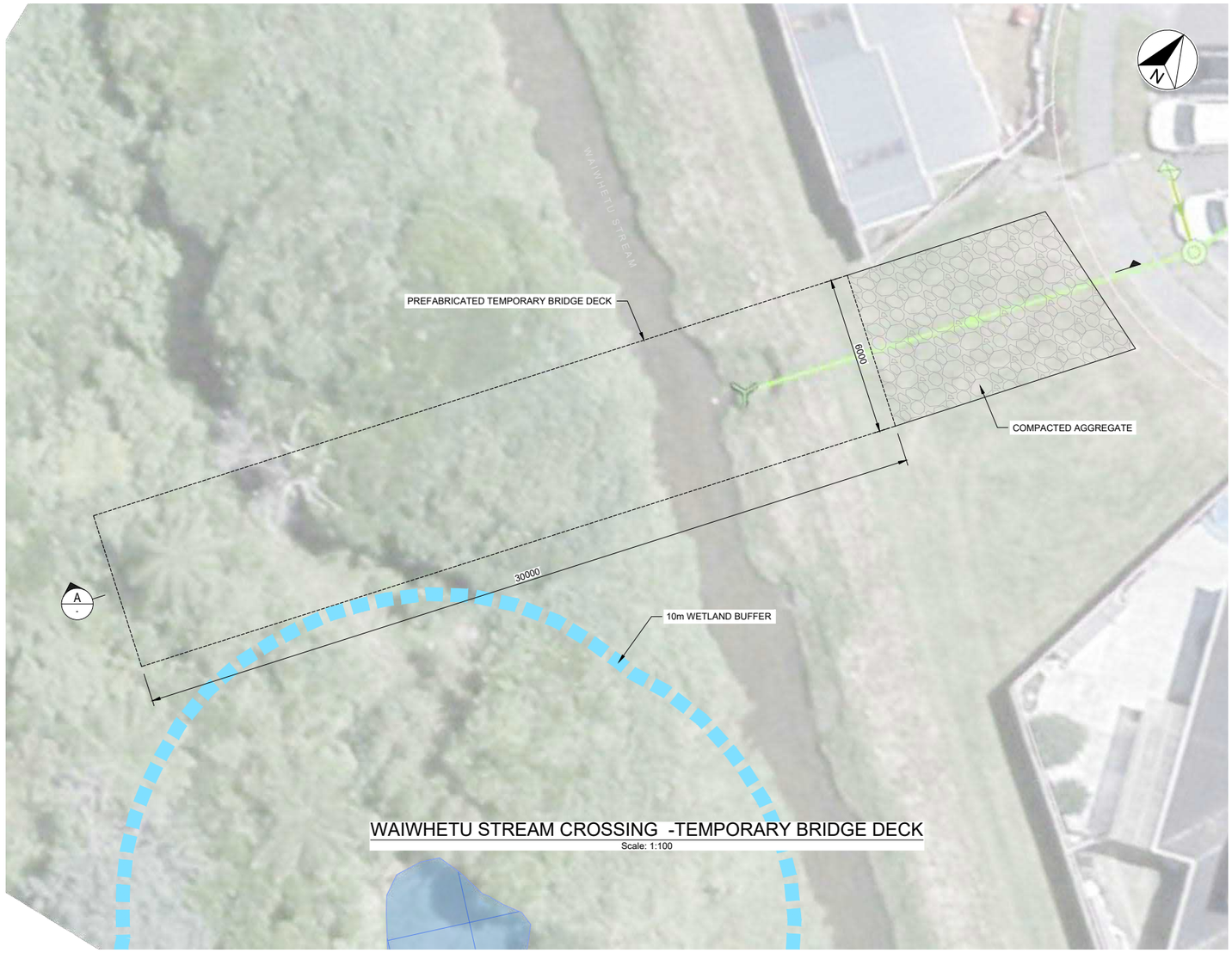
Discipline: CIVIL
Drawing No.: 3-WW021.02_C013
Rev.: 1

DOCUMENT PATH: \\CORP\ANZ\PROJECTS\NZ3W3-WW021.02 NAENAE NO.2 RESERVOIR\HOME\700 DRAWINGS
DOCUMENT NO: 3-WW021.02_C013.DWG

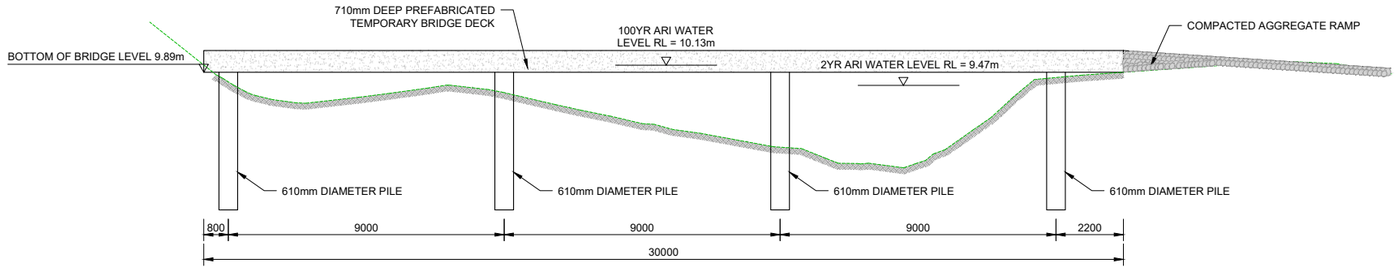
DO NOT SCALE - IF IN DOUBT ASK

PLOTTED BY: PIETERSEN, RIAAN

DRAWING PLOTTED: 27-Jul-23



WAIWHETU STREAM CROSSING -TEMPORARY BRIDGE DECK
Scale: 1:100



WAIWHETU STREAM CROSSING - TEMPORARY BRIDGE DECK
Scale: 1:100

NOTES:

1. DO NOT SCALE OFF DRAWINGS.
2. VERTICAL DATUM NZVD 2016.
3. ARI = AVERAGE RECURRENCE INTERVAL. ALSO KNOWN AS THE RETURN PERIOD.

A1 REPRODUCTION SCALE
100 80 60 40 20 0mm
SCALE 1:200 AT ORIGINAL SIZE (A3)

A3 REPRODUCTION SCALE
50 40 30 20 10 0mm
SCALE 1:100 AT ORIGINAL SIZE (A1)

FOR INFORMATION
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
1	ISSUED TO WWL	R.P.	J.D.	J.L.	24/11/23
0	ISSUED FOR INFORMATION	R.P.	L.H.	J.L.	29/09/23

Drawing Originator: Connect Water — a+ WSP, PO Box 12-003 Thorndon, Wellington 6144, T 64 4 471 7000

Original Scale (A1) AS SHOWN	Design	L.H.	24/11/23
	Drawn	R.P.	24/11/23
Reduced Scale (A3) 1/2 SHOWN	Dsg Verifier	J.D.	24/11/23
	Dwg Check	J.D.	24/11/23

Approved For Construction* -
Date: -
* Refer to Revision 1 for Original Signature

Client: Wellington Water

Project: WELLINGTON WATER
EASTERN HILLS RESERVOIR

Title: CONSTRUCTION METHODOLOGY
TEMPORARY STAGING BRIDGE
CONCEPT

Discipline: CIVIL

Drawing No.: 3-WW021.02_C015

Rev.: 1

DO NOT SCALE - IF IN DOUBT ASK

PLOTTED BY: PIETERSEN, RIAAN

DRAWING PLOTTED: 21-Jun-23

DOCUMENT PATH: \\CORPIANZ\PROJECTS\NZ\3W\3-WW021.02 NAENAE NO.2 RESERV\OIR\HOME\700 DRAWINGS

DOCUMENT NO: 3-WW021.02_C015.DWG

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