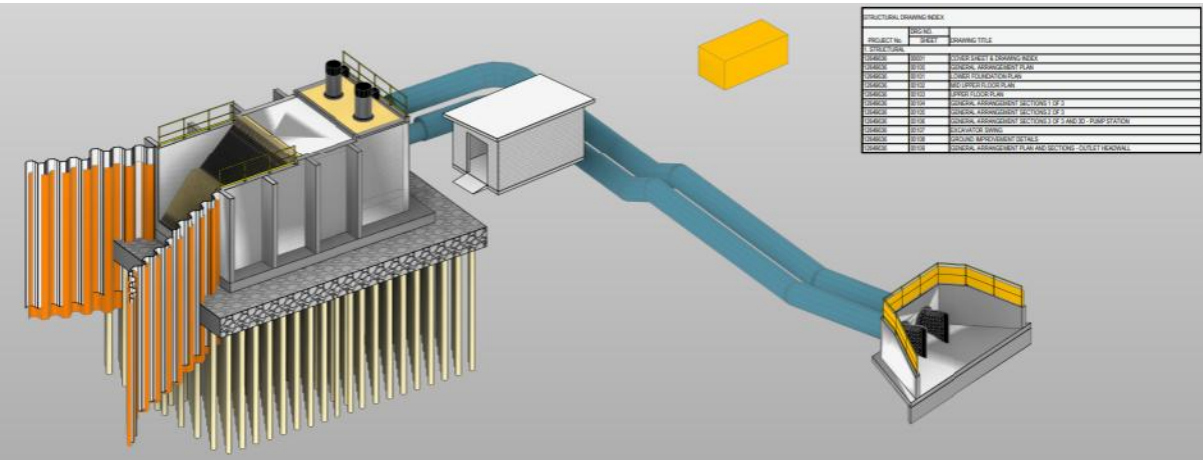


Preliminary Design Report - Pakowhai Pump Station

Construction Methodology



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Indicative Construction Programme Summary

Construction Programme	Start	Complete
Design	1/01/2026	30/09/2026
Mobilisation	1/08/2026	30/09/2026
Construction	31/08/2026	31/07/2027
Disestablishment	1/06/2027	30/09/2027

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The Pakowhai Pump Station will be constructed at the same time as Awatoto Pump Station, with its own dedicated crew and service crane. The construction approach is largely similar, but the key difference is that the design footprint sits in the middle of the canal, requiring a significant stream diversion around the cofferdam before excavation can begin.

Site Establishment

BPC will begin by engaging with Hawke’s Bay Regional Council (HBRC) and other relevant stakeholders who require access via Sissons Road. Given the long, unsealed track between the site and Sissons Road, dust suppression measures will be implemented. This will include limiting traffic volumes and speed, along with regular water application from a water cart to keep dust levels under control.

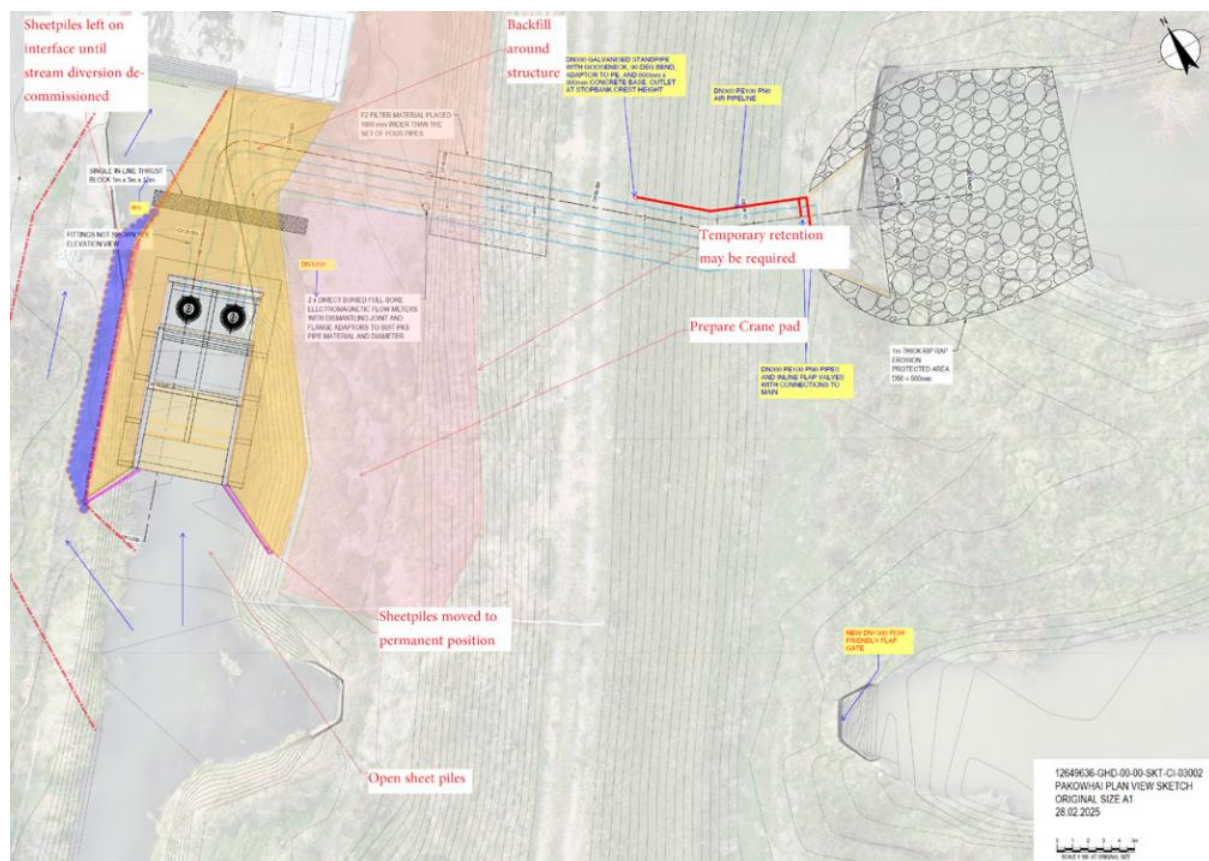
Perimeter fencing and a lockable access gate will be installed to control site access and maintain security. HBRC’s lockable gate at the end of Sissons Road may be used for shared access, or opening times will be agreed upon in advance.

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The overhead power line supplying Pakowhai's transformer will be decommissioned and relocated underground so it does not interfere with construction activities. This will remove potential safety risks and avoid disruption during construction.

A hardstand area will be established in a greenfield area adjacent to the site, with bunting flagged posts erected under powerlines for safety. The hardstand will be used solely for construction-related purposes, including site amenities, operational activities, vehicle car parking, storage of materials and equipment.

Prior to the commencement of permanent works, the site will be set out, and legal boundaries will be verified to ensure all works are undertaken within approved land designations and consented areas.



Commissioning layout for Pakowhai.

As part of the Construction Environmental Management Plan (CEMP), measures will be implemented to manage waste, concrete washout, and hazardous substances. Designated concrete washout areas and fuel storage/refuelling areas will be established within the site, with minimum setback distances maintained from watercourses and water discharge points to protect the receiving environment.

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These controls will be incorporated into the site establishment layout and communicated to all personnel as part of the site induction process.

Aggregate hardstand areas will be incorporated within the site to provide stable working surfaces and act as silt control measures, preventing the tracking and migration of sediment beyond the site boundary.

An emergency spill response plan and spill kits will be maintained on-site at all times and will form part of the CEMP to ensure prompt and effective response to any accidental release of contaminants.

The existing pump station and associated services will be protected throughout construction. Survey monitoring targets will be installed on key structural elements of the existing pump station and monitored at regular intervals during the construction of the new works.

This monitoring regime will enable early identification of any movement or potential effects, including those associated with dewatering activities, and will allow timely implementation of mitigation measures to safeguard the structural integrity and continued operation of the existing infrastructure.

Pump Station Construction

The new pump station will be constructed in front of the existing pump station and to maintain operational continuity and reduce flood-related service risk to Stakeholders during construction a stream diversion will be installed.

To minimise work within the active water body, BPC will install sheets offline as far as possible limiting the quantity of sheet piles required to be installed in the live channel. A 'livening day' will be scheduled to transition the diversion into operation, either by constructing a bund across the live waterway to isolate the pump station footprint or by installing sheet piles inside the canal in stages, creating a controlled barrier between the active water flow and the construction zone. This process will be timed for dry conditions, so we have a smooth transition with minimal environmental impact.

Construction will be undertaken using a staged approach. The first stage comprises installation of SP4W sheet piles to form a cofferdam around the pump station footprint, creating an approximately 17 m × 12 m box excavation with sufficient internal working room around the perimeter of the proposed base slab.

The 15 metre-long sheet piles will be installed using a 110T crawler crane with a vibro hammer, with the crane positioned on the prepared hardstand to provide stable access and reach for installation.

Once the cofferdam is established, excavation will proceed within the sheet-pile enclosure from existing ground level down to the ground-improvement founding level. There is not expected to be any contaminated ground encountered, however if there is found to be contamination this material will be excavated using excavators and transported by truck to covered on-site stockpiles for

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subsequent re-use within designated fill areas where appropriate or otherwise transported to approved off-site fill locations or licensed facilities suitable for contaminated material. Handling and management controls (including appropriate PPE and environmental protection measures) will be implemented in accordance with the Construction Environmental Management Plan (CEMP) and relevant OIC requirements.

The total excavated cut to waste volume on-site is minimal as the site requires fill, from onsite excavations and imported fill, to form design levels.

Dewatering will be undertaken as we excavate at low inflows estimated approximately 10L/s -12L/s, within the cofferdam in controlled stages. Given the permeable soil conditions anticipated, dewatering will be managed via sumps located at the corners of the excavation, with drainage channels formed to direct inflows efficiently to sump locations to support a semi-dry working environment to construct.

Dewatering activities, including any temporary groundwater take and discharge, will be managed and monitored in accordance with the approved temporary works design, the Construction Environmental Management Plan (CEMP), and the relevant OIC conditions.

The groundwater take is expected to be approximately 864 m³/day-1,000 m³/day (a continuous abstraction over 24 hours).

To manage discharge volume and quality, the Contractor will implement a combination of sediment control measures as outlined in the CEMP. These measures may include, but are not limited to, on-site filter media around dewatering sumps, sediment ponds located either on-site or off-site, turkey nest, sediment traps, and lamella clarification where required. Scour protection will be installed in advance to support dewatering activities to these devices.

Onsite assessment for will continue for excavation stability during construction. Monitoring will include settlement and structural stability considerations, enabling timely response should movements occur due to dewatering influences, seismic events, flood conditions, or external loading changes.

At the founding level within the cofferdam (approximately 6.5 m below existing ground level), an aggregate raft and timber piles, 8m long, will be installed at approximately 900 mm centres to provide ground improvement. Works will be completed using a combination of on-site plant, lifting equipment, and compaction equipment appropriate to the approved temporary works methodology and construction staging.

Following completion of the ground improvement works and preparation of the hardfill layer, construction of the new pump station foundation slab will commence. Given the structural significance of the foundation, the base slab will be constructed in situ and completed as a single mass concrete pour once reinforcing steel and formwork installation is complete.

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Where necessary to achieve the required structural integrity and quality of finish, large concrete pours may be undertaken outside normal working hours. All work will otherwise be undertaken within the contracted hours defined in the CEMP, and any works proposed outside these hours will be subject to prior approval from Hawke's Bay Regional Council.



Example of working within a cofferdam, early morning concrete pour for pump station foundations

The pump station walls and roof structure will be constructed using precast concrete panels, which will be lifted and installed by crane onto the completed foundation slab. The use of precast elements enables efficient construction while maintaining a high level of quality and dimensional control.

Minor in situ concrete pours will be used to tie the precast elements together and to achieve a watertight structural outcome. Where practicable, concrete pumps will be used to place concrete directly from delivery vehicles to the pour locations, minimising environmental disturbance and improving overall construction quality.

Once the primary concrete structure is substantially complete, final bolt-on components will be installed. These works include installation of the pumps, structural steel elements, debris screens, handrails, gratings, and associated ancillary components.

Following completion of the structural works, the excavation will be progressively backfilled using approved on-site stockpiled material up to finished ground level. Upon completion of backfilling, the temporary sheet piles will either be extracted and removed off site or repositioned to form part of the permanent inlet channel works. This will conclude the primary pump station construction phase and enable preparation for commissioning.

Once backfilling is complete, the wider civil works will be undertaken. These works will include installation of supporting utilities infrastructure, construction of accessways, and completion of final

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landscaping and security features. Imported granular material will be placed as required to form durable access surfaces.

Construction of the Motor Control Centre (MCC) building will also be undertaken during this stage. Following completion of the civil and building works, electrical installation will be carried out, including installation of the main switchboard, connection of Variable Speed Drives (VSDs), and provision of connections to the designated future mobile emergency generator area.

Pre-commissioning checks will be undertaken on all electrical and mechanical systems to confirm they are fully operational and compliant with design requirements prior to commencement of final commissioning activities.

Outfall Pipe Installation through the Stopbank

The Pakowhai Pump Station outfall pipeline will connect directly to the pumps and extend through the existing stopbank to a new wingwall with riprap-protected discharge. The commencement and completion of these works will be carefully staged to ensure precision, environmental compliance, and minimal disruption to stakeholders.

Outfall works will be closely coordinated with the pump station structural construction and will be completed prior to final landscaping and Motor Control Centre (MCC) building works.

Pipe sections will be delivered to site in appropriate lengths and welded on-site to span the stopbank. Temporary vehicle and pedestrian access diversions and/or closures will be implemented as required. All traffic and access movements will be managed in accordance with the approved Traffic Management Plan (TMP) and Construction Environmental Management Plan (CEMP), with clearly delineated exclusion zones and appropriate signage provided.

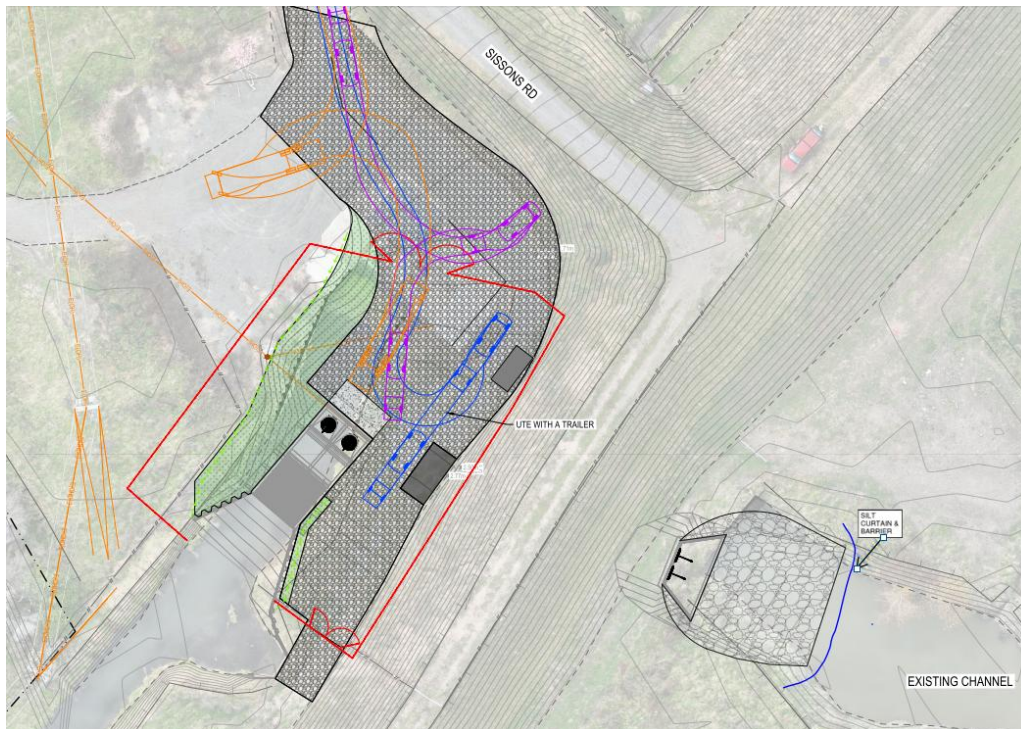
Prior to commencement of stopbank excavation, all necessary approvals will be obtained in accordance with the CEMP and OIC conditions. Works will only proceed during an identified suitable weather window to reduce flood and environmental risk. Ongoing weather monitoring will be undertaken throughout the works, and a site-specific flood response plan will be in place, including a dedicated response team and staged excavated material positioned to allow rapid reinstatement in the event of unforeseen heavy rainfall.

Excavation will proceed progressively along the pipeline alignment. All excavation activities will comply with the CEMP, OIC conditions, and the Guidelines for Erosion and Sediment Control. Stopbank material will be stockpiled within a designated area adjacent to the works to enable efficient and rapid backfilling during construction or in the event of an emergency. Stockpiled material will be sealed and/or covered to maintain material integrity prior to reinstatement and compaction.

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Prior to installation of the 1.0-metre-thick riprap-protected erosion zone, or commencement of any damming works within the river environment, a silt curtain will be installed upstream along the perimeter of the designed works area. This measure will limit the migration of suspended sediments during construction activities. Riprap will then be placed underwater using a long-reach excavator to minimise turbidity and reduce environmental disturbance.



Riprap erosion work with silt curtain

Final reinstatement works on banks, and disturbed areas will include placement of topsoil, mulching, hydroseeding, and landscaping. All areas disturbed by the works will be restored to a condition consistent with, or better than, the pre-construction state.

Commissioning and Demolition

Commissioning of the new pump station will be undertaken through a staged testing process to verify performance and confirm compliance with design specifications prior to the existing pump station being made redundant and the new facility brought fully online. A range of testing techniques will be employed to provide confidence in pump operation, controls, and system integration. Where required, a recirculation testing method will be used by closing stoplogs within the pump station to allow controlled pump testing without discharge to the receiving environment.

Once the new pump station is commissioned, the temporary intake channel immediately upstream of the existing pump station will be disestablished to allow dry and safe demolition activities of the existing pump station. Demolition of the existing pump station will then be undertaken using a

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staged, top-down approach to enhance safety, maintain environmental compliance, and minimise impacts on adjacent infrastructure and the new pump station.

Before demolition activities commence, a detailed Demolition Plan will be prepared and approved. All demolition works will be incorporated within the Construction Environmental Management Plan (CEMP), including measures to prevent contaminants entering adjacent waterways and to manage sediment and debris. Demolition of the existing channel and associated structures will be staged to maintain continued operation of the existing pump station as required to manage catchment flood levels until the new pump station is fully commissioned.

A detailed demolition sequence will be developed, identifying salvageable components, deconstruction methodologies, and risk mitigation measures. This sequence will address public safety, environmental controls, protection of surrounding infrastructure, and interface risks with the new pump station.

Once the existing structure has been fully decommissioned, the existing outfall pipe will also be decommissioned and permanently capped. The contractor will implement strict environmental controls in accordance with the CEMP, ensuring the outfall is sealed approximately five metres upstream within the existing pipeline in a safe and compliant manner.

Following completion of commissioning, demolition, and decommissioning works, final site restoration and site disestablishment will be undertaken in accordance with the CEMP, leaving the site in a condition consistent with the approved design and OIC conditions.