

Preliminary Design Report - Awatoto Pump Station

Construction Methodology

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Indicative Construction Programme Summary

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

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Site Establishment

Overhead electrical line utilities that conflict with the preliminary design works will be relocated underground by Hawke's Bay Regional Council prior to the Contractor establishing on-site. This will remove potential safety risks and avoid disruption during construction.

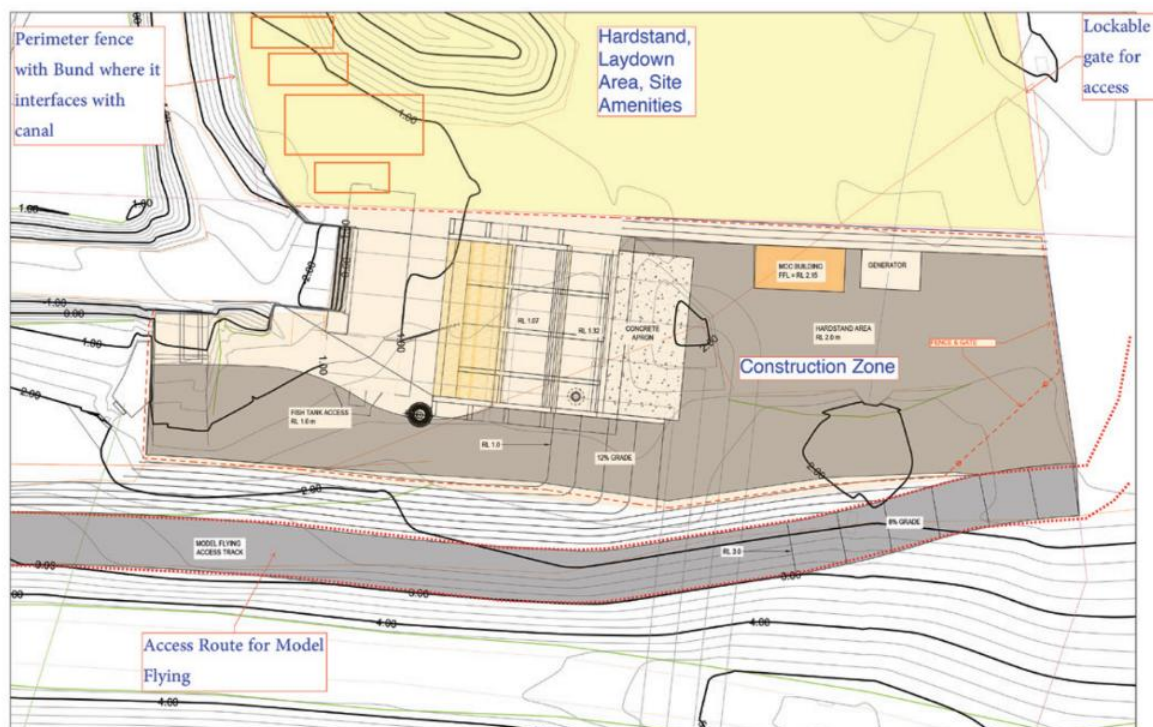
A temporary hardstand area will be established to the north of the pump station on Ravensdown-owned land, inside the Order in Council (OIC) footprint. The hardstand will be used solely for construction-related purposes, including site amenities, operational activities, vehicle car parking, storage of materials and equipment.

Perimeter fencing and a lockable access gate will be installed to control site access and maintain security. Silt bunding and sediment fencing will be provided along the intake water channel and around the perimeter of the works area to manage sediment and environmental effects in accordance with consenting and environmental management requirements.

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.

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Hardstand area with construction zone, gate access and access route delineated.

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.

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

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truck to covered on-site stockpiles for 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 volume on-site is estimated to be approximately 1,000 m³(solid), of which approximately 300 m³ (solid) is currently anticipated to comprise contaminated material. Ongoing inspection and monitoring will be undertaken during excavation to confirm the extent of any contaminated material encountered within the cofferdam and other areas of excavation, particularly within the upper 1.0 metre below existing ground level. This will ensure that contaminated and uncontaminated materials are appropriately identified, segregated, and managed in accordance with approved disposal and reuse.

Dewatering will be undertaken as we excavate at low inflows estimated at 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 range between approximately 864 m³/day-1,000 m³/day (a continuous abstraction over 24 hours).

To manage discharge quantity and quality within the OIC limits, 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.

On-site assessments will continue throughout construction to monitor excavation stability. 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 m below existing ground level), an aggregate raft and 8-metre-long timber piles, 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.

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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.

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

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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 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 Awatoto 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. Installation will commence at the southern end beneath the vehicle access route servicing the Model Plane Club. 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.

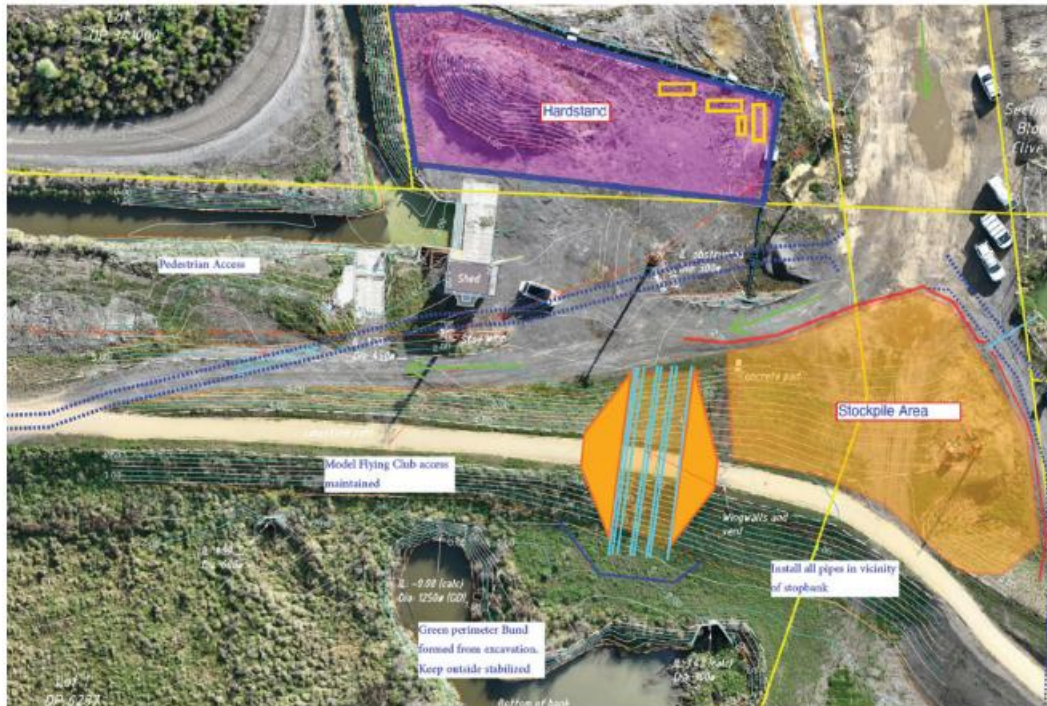
Prior to commencement of stopbank excavation, all necessary approvals will be obtained in accordance with the CEMP and OIC conditions. Works will only proceed during an identified suitable weather window to reduce flood and environmental risk. Ongoing weather monitoring will be undertaken throughout 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

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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.



Stockpile area, pedestrian access and install of outfall pipe.

During construction through the stopbank, pipeline ends will be temporarily sealed to prevent ingress of water and sediment. Full reinstatement of the stopbank will be completed to its original design profile immediately following pipe installation.

The remaining northern outfall installation connecting back to the pump station will only proceed once the pump station structure is complete and temporary sheet piles have been removed. Where required, the remaining outfall pipe will be installed in short, localised trench sections, with sequential backfilling undertaken to minimise exposure and environmental risk.

Groundwater ingress into the pipeline excavation is anticipated during sections of the pipeline installation, with groundwater inflows estimated at approximately 1,500 m³/day. Dewatering will be managed using techniques and controls consistent with those applied within the pump station cofferdam works. Water quality will be managed in accordance with the CEMP and OIC requirements, with sediment-laden water directed to an approved nearby pond where required, and clean water returned to the river where permitted.

A temporary construction access route over the stopbank will be established either prior to or following pipeline installation as required to facilitate headwall construction and ground improvement works. These works will be undertaken using similar plant and methodologies to those employed for the pump station construction.

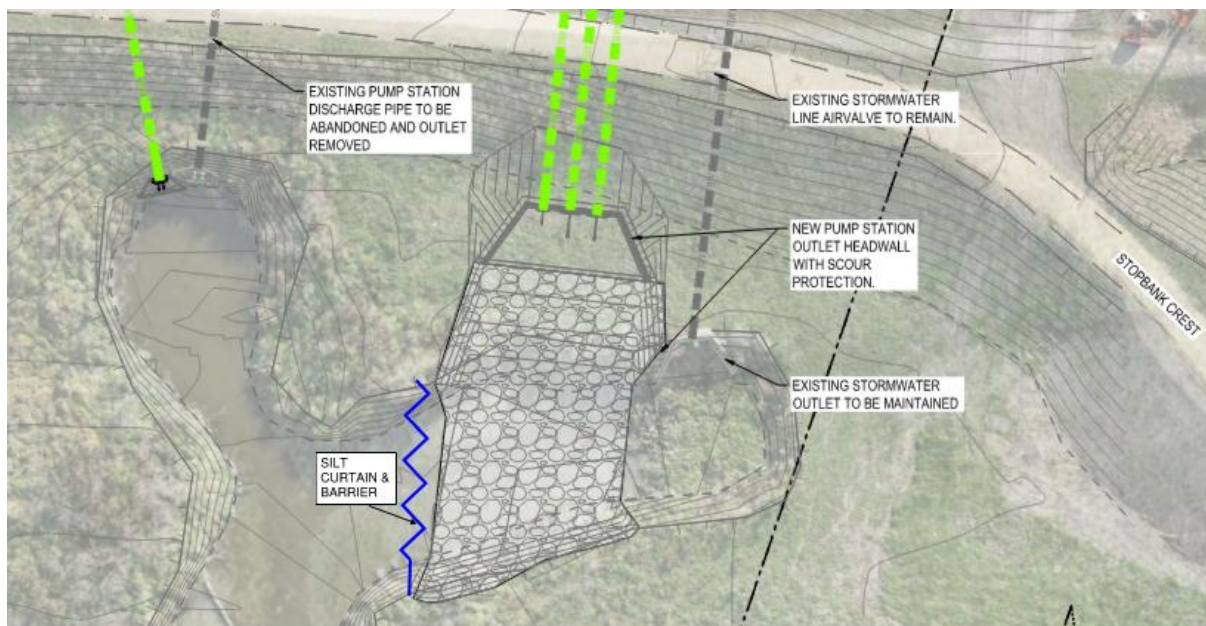
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The outfall headwall will be constructed using a combination of in situ concrete and precast components to achieve construction efficiency and long-term durability. To facilitate the headwall works, an earth-bunded cofferdam will be established, taking advantage of its offset location away from the river opening. Where required, additional damming techniques may be implemented, including the use of steel plates, sheet piles, or a purpose-designed earth-filled dam, to allow the work area to be adequately dewatered.

Prior to any dewatering activities, coordination will occur with the relevant parties to confirm compliance with the OIC conditions. The temporary bunding will not be opened to the river mouth adjacent to the existing outfall pond until the wingwall construction is complete and riprap placement is ready to commence.

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 an 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

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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.

Prior to final commissioning, the existing intake channel immediately upstream of the existing pump station will be isolated using temporary sheet piling to enable dewatering and safe demolition activities. Demolition of the existing pump station will then be undertaken using a 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.