# HIBISCUS COAST PUMP STATION – ACCELERATED DELIVERY REDUCING COST AND CARBON


***Waldo Strydom (Watercare Services Ltd.), Gabrielle Ip (WSP)***



**ABSTRACT (500 WORDS MAXIMUM)**

As the water and wastewater supplier to 1.7 million Auckland residents and businesses, Watercare determined the need for a replacement Hibiscus Coast Water Pump Station (HBC PS) to provide resilience for population growth and peak summer demand in the Hibiscus Coast Area (north of Auckland).

This paper demonstrates an alternative and innovative delivery model which successfully accelerates the project by challenging conventional approaches while achieving efficiencies and savings.

Watercare faced delays with the acquisition of the preferred property resulting in a modular staged approach. This became a necessity to decouple the objectives by bringing 270 litres per second capacity online before summer peak demand. As a result, the immediate solution was completed within 5 months from detailed design to construction, and the final solution 12 months following.

Immediate solution delivered a prepared site including: power and communications, the building slab, pipework to connect to both bulk mains, a single pump with a containerised control room. We estimate this was achieved in less than half the time of using a traditional approach.

The unconventional delivery strategy challenged typical approaches to consenting, design, procurement, and construction to achieve the overall objective, while delivering to Watercare's Enterprise Model 40:20:20 delivery objectives:

- reducing carbon in infrastructure by 40% by 2024,
- reducing the cost to deliver the infrastructure programme by 20% by 2024,
- improving the health, safety and well-being of all people involved in delivering our infrastructure by 20% year on year.

Accelerated delivery was achieved by identifying critical project outcomes and decoupling key programme activities. These included:

- Delivering key design functions by splitting work packages into an immediate and final solution. This allowed for staged design and early construction commencement and deferred lower priority activities across to a parallel programme.
- Designing within the permitted prescribed resource consenting activity limits reduced the programme by at least 3 months.

- Actively managing procurement of critical path equipment and reducing lead times by off-site manufacture. This included repurposing a spare pump; securing surplus pipework from a parallel project; procuring the off-site manufacture of a containerised control room.

Carbon was reduced by minimising the site footprint; a lightweight building structure and utilising surplus equipment.

Cost savings were achieved - despite the compressed programme - This was done by challenging traditional approaches; advancing from concept to detailed design and/or IFC; challenging design standards where appropriate; using surplus material and spare equipment no longer required by other projects / facilities, delivering a total 5% budget saving.

The compressed programme and off-site manufacture reduced onsite construction and the likelihood of lost time injuries.

The approach used in the Hibiscus Coast pump station project provides an alternative delivery foundation for other projects across New Zealand; whether in the construction of a pump station or meeting challenging construction deadlines. The highly collaborative, innovative and outcome focused approach is easily replicable to meet the forecast demand and resilience requirements, while navigating uncertainty associated with procurement and consenting delays, infrastructure decarbonisation and broader industry resource challenges.

**KEYWORDS**

**Pump Station design, project efficiencies, fast-tracked delivery, carbon reduction, cost savings, offsite manufacture, modular design**

**PRESENTER PROFILE**

Waldo's background is in civil and water engineering with over 10 years of experience in design, contract administration, procurement and project management. He is a Principal Engineer for Watercare and was the design project manager for the Hibiscus Coast booster pump station project.

Gabrielle is a Civil Engineer with over 7 years of experience in the water industry. As a Senior Engineer for WSP, she has a focus on design and project management specialising in delivering water projects. She was the pump station design manager for the Hibiscus Coast booster pump station.

# 1. INTRODUCTION

The new Hibiscus Coast Water Pump Station (HBC PS) was required to provide resilience for population growth and peak summer demand in the Hibiscus Coast Area (north of Auckland). The Hibiscus Coast region is situated across the Hauraki Gulf coast and supports a growing population of over 60,000 people. This is comparable to the population of New Plymouth or Rotorua [(6)].

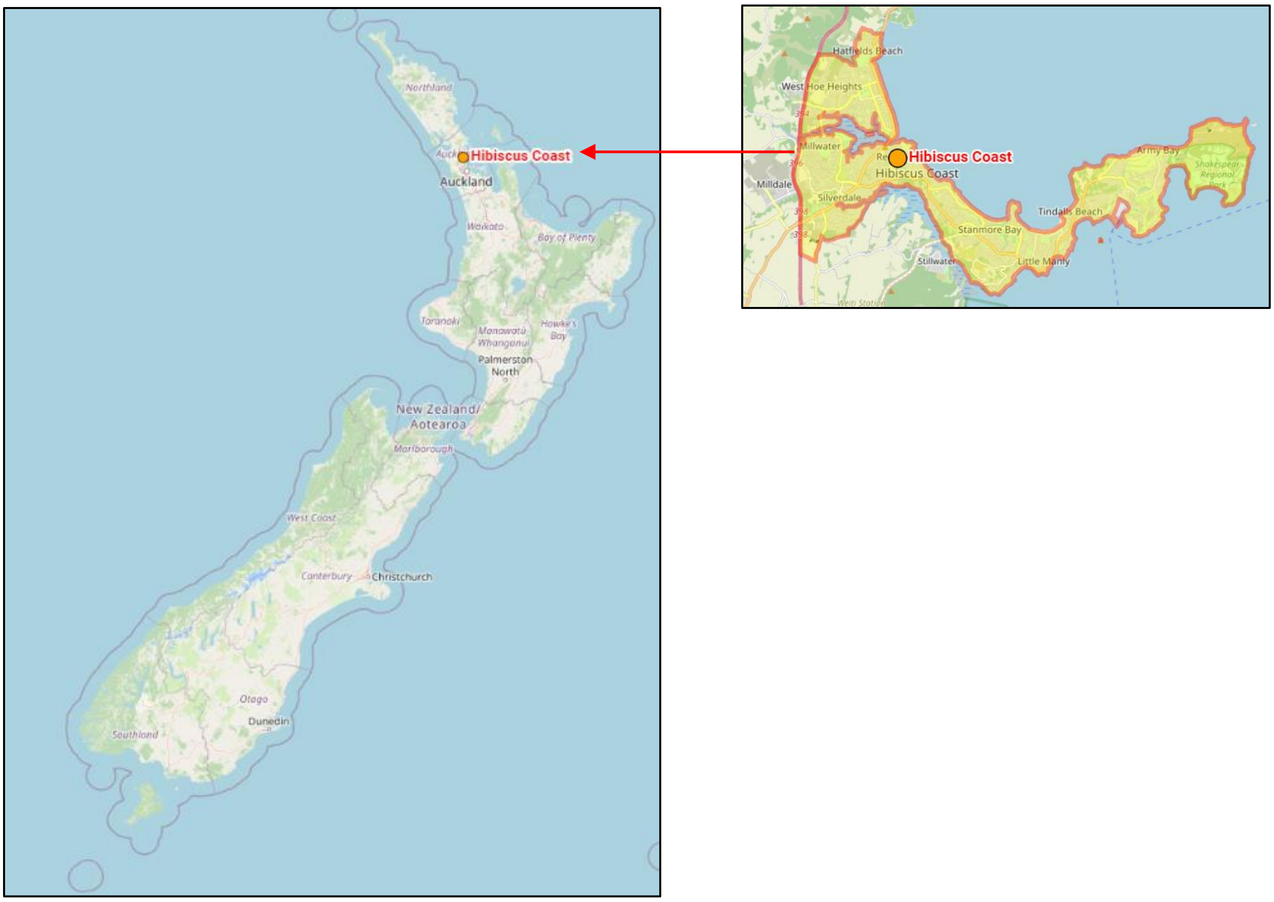



*Figure 1: Hibiscus coast region locality*[7]

The existing East Coast boost pump station was constructed circa 1994 to infrequently boost flows through the Orewa 1 to fill the Maire Rd. Reservoir. The pump station had been operating almost continuously since 2019 to meet daily demand of this region.

This configuration had a peak supply capacity of 17 MLD (mega litres per day) through the boosted Orewa 1 water main and the gravity-fed Orewa 2 water main. In 2020, summer peaks were nearing 13MLD and based on the past years growth projections, the existing system could potentially be at capacity – and therefore poor resilience - for the following summer.

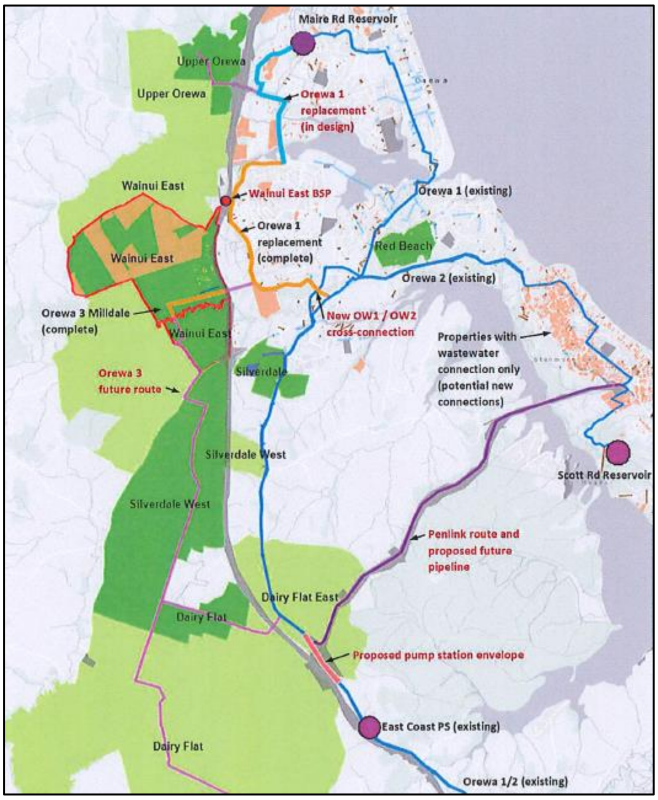



*Figure 2: Bulk water distribution network for Hibiscus Coast region*[5]

Existing pump station constraints included:

- Limited space within the underground structure to accommodate upsized equipment
- Ventilation was not up to current standards
- No available hardstand area for a backup generator
- Site access was considered unsafe being located within the road reserve

In addition, the location of the existing pump station was also likely to impede on the possible future rapid transit network alignment along East Coast Rd.

*Figure 3: East Coast boost pump station within road corridor* [4]

# 2. DELIVERY APPROACH

A conventional infrastructure project would normally follow a phased approach, first completing design before engaging contractors and undertaking physical works.

With this project being driven by an immovable deadline to meet the anticipated summer needs of Hibiscus Coast customers, the programme, staging of works (both design and construction) and procurement of equipment needed to challenge the normal way of delivery.

A clear strategy was documented to set out critical priorities, scoping the delivery of works into plausible packages forming part of the "*immediate*" and "*final*" solution. These packages were subsequently split into separable portions for the execution of the physical work shown in *Table 3*.

The *immediate* solution was to address the urgent need to meet summer peak demands in the Hibiscus Coast Area. This included enabling works, site establishment and access, initial earthworks, cross connection pipework and tie in of Orewa 1 and 2, power supply, and critical operating equipment (one pump and containerised switchroom) and shown in *Figure 7*.

The *final* solution addressed the future needs of population growth and resilience for the demand in the area. This solution includes ancillary civil site work and the installation of the remaining pumps, pipework and pump station building and shown in *Figure 8*.

The adopted strategy first decoupled key programme activities from non-essential tasks to identify and sequence critical milestones including:

- Land acquisition including planning
- Engagement of partners - consultants and contractor
- Defining an immediate and permanent (final) solution
- Early procurement of materials & design of immediate solution
- Site establishment and early works (earthworks)
- Construct and commission immediate solution (1 pump operating on a concrete slab, including buried pipework)
- Construct and commission the permanent solution
- Decommission the existing pump station (East Coast pump station)

For the purpose of expediting the physical works contract, these milestones assisted in developing the programme and packaging works into separable contract portions.

*Figure 4* illustrate the comparison between conventional delivery and the approach adopted for this project. This highlights the differences in approach and how the team maintained focus on the delivery of work packages and outcomes required.

Through this accelerated process, a high level of collaboration and coordination between all key parties such as design outputs were agreed early with the construction partners and considerable design support during the construction stage. Furthermore, early engagement of suppliers specialising in the design and build of "*turnkey*" equipment such as the containerised switchroom and pump station structure further accelerated the project programme.

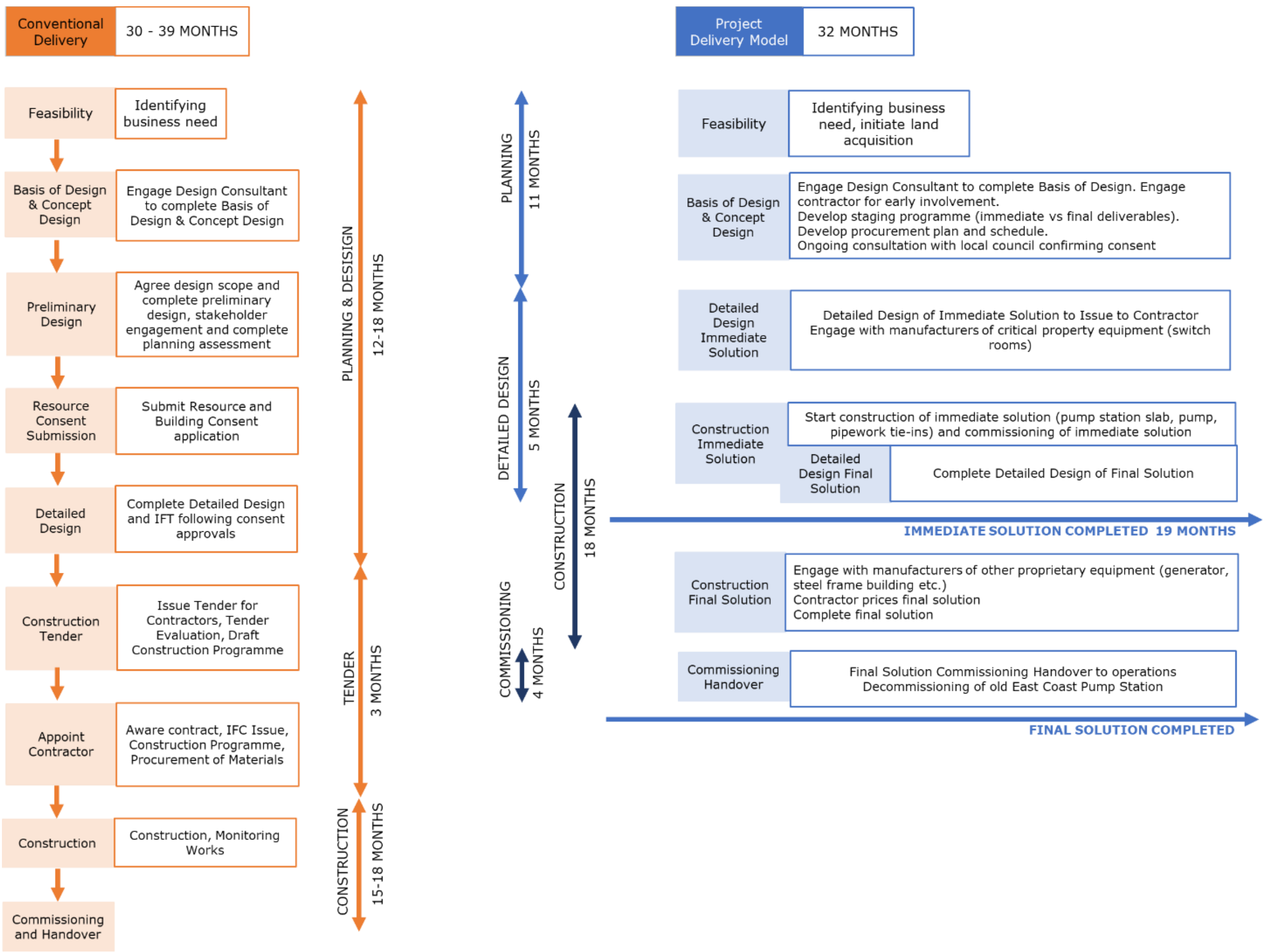



*Figure 4: Comparison between conventional delivery and HBS PS model*

## 2.1 LAND ACQUISITION AND PLANNING

### 2.1.1 LAND ACQUISITION

With expansion of the existing East Coast boost pump station site being discounted, an alternative enveloped area was identified to pin-point potential sites. This was based on the availability of land and proximity to the existing Orewa 1 & 2, but also the future cross-connection for the future Orewa 3 pipeline.

Land acquisition often requires extensive negotiation or legislative pathways that can take lengthy periods of time to resolve before further project planning can progress. For these reasons, a long list of sites was identified early on and a multi-criteria assessment carried out whilst consulting with all project partners. What also added good context was overlaying existing pump station facilities of a similar size over potential land parcels. This helped the project team to gain a better understanding of spatial and access requirements. The key assessment criteria for the sites included:

- Traffic – considering safe access and driver visibility from the road
- The geotechnical profile of the underlying ground to gauge requirements for ground improvement works
- Proximity to overland flow paths and the potential for flooding
- Property ownership (private versus public) and locality to existing or planned major projects that may affect the staging and execution of physical works
- A preliminary planning assessment to review the permitted activity status of planned works

*Table 1* below provides a full list of the assessment criteria and the respective weightings agreed by the project planning group.

*Table 1: Assessment criteria and weighting for identifying preferred sites*

| **Site Selection Criteria** | | **Site Selection Scoring (proposed weighting)** | **Example wording for a high score (5/5)** | **Example wording for a low score (1/5)** |
|---|---|---|---|---|
| **Land** | Land Ownership | 10% | Crown | Private |
| | Land use | 8% | Vacant land | Planned development |
| | Planning | 8% | Consent for pump station only | Consent for pump station, vegetation clearance, building in flood plain |
| | Usable area | 10% | >800m2 allowing space for future dosing and tanker filling | < 400m2 – only space for permanent pump station |
| **Operability** | Operational flexibility & hydraulics | 8% | No constraints | Constraints to maximum pressure and connectivity |
| **40:20:20 (Carbon)** | Carbon | 8% | Low capital and operational carbon | High capital and operational carbon |
| **40:20:20 (Cost)** | Geotechnical | 10% | Northern Allochton – toe | Historic instability |
| | Constructability - cost | 8% | Few cost increasing constraints | Significant cost increasing constraints |

| | | | | |
|---|---|---|---|---|
| **40:20:20 (Safety)** | Constructability – safety (excludes traffic access) | 5% | Few safety constraints | Significant safety constraints |
| | Traffic access | 15% | Existing access with left shoulder and right turning bay | Limited room for new access, short sight distances |
| | Flood hazard | 10% | Far from streams and flood prone areas | Very close to stream but outside identified floodplain and flood prone areas |

Although Option 4 was initially identified as the preferred option, there was uncertainty and risk associated with the agreement for works on this site, which involved a designation by another public infrastructure provider. It was therefore decided early on that consultation with the private landowner for the second preferred option (roughly 2C) would also be progressed in conjunction with planning due diligence to gauge permitted activity status. This was carried out with close consultation between Watercare and Auckland Council's consent planning teams.

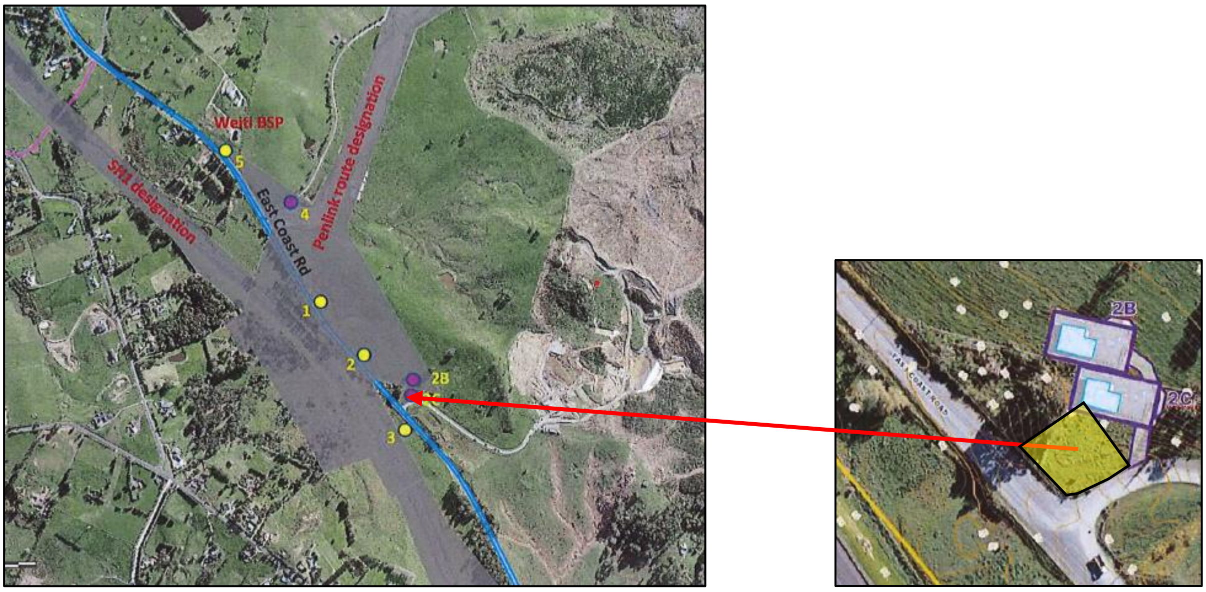



*Figure 5: Hibiscus Coast Water Pump Station site selection options* (2)

### 2.1.2 CONSENT PLANNING

Early and ongoing engagement between Watercare's consent planner and Auckland Council's regulatory advisor provided helpful clarity on the scope of work considered exempt from obtaining building consent. As a network utility operator (NUO) with building works being designed and reviewed by a chartered professional engineer, both the pump station building and retaining wall were identified during consultation as exempt structures in accordance with *Schedule 1* of the Building Act.

A similar exercise was carried out to determine the permitted limits listed under the Auckland Unitary Plan activities. As the site was zoned outside the urban area, situated away from an overland flow path, and subject to a relatively small footprint, the majority of activities associated with construction and operation fell within permitted activity standards.

This assisted the design to move swiftly from feasibility through to a detailed phase, also contributing to the early establishment of contractors on-site and contributing to a wide range of savings discussed.

## 2.2 ENGAGEMENT OF PARTNERS

### 2.2.1 ENGAGEMENT OF CONSULTANTS AND CONTRACTOR

Following the business case approval, a Procurement Plan was developed to approve the engagement with both consultants (GHD and WSP) and the appointed contractor (Fulton Hogan). This allowed the contractor to provide input on design practicalities and the required level of design (LOD). The early engagement of the contractor also allowed construction works of the immediate solution to start while finalising the design of the permanent structure and ancillary features.

### 2.2.2 POWER SUPPLY

Proactive and early engagement with Vector during feasibility confirmed that there was sufficient electrical capacity within their network to accommodate the proposed pump station. The power to the site was installed prior to the commissioning date of the immediate solution.

### 2.2.3 SPECIALIST SUPPLIERS (CONTAINERISED SWITCHROOM)

To accelerate the delivery of the project, Entec was engaged for the design and supply of a containerised switchroom. This was easily replicated by using standard drawings and design from previous Watercare projects. Due to the early engagement, the containerised switchroom was ready to be mobilised to site early 2022. This seamlessly fitted into the site establishment works and the construction programme.

*Figure 6: Containerised switchroom*

## 2.3 EARLY PROCUREMENT OF MATERIALS AND DESIGN OF IMMEDIATE SOLUTION

The Procurement Plan also sought approval for the purchase and acquisition of equipment. This approach ultimately allowed design and construction activities to progress in an “offset parallel” fashion, i.e., construction activities closely followed the completion of design milestones with no unanticipated long lead surprises.

This was primarily driven by the urgency of completing the immediate solution by March 2022.

The list of "*free issue*" equipment purchased and acquired by Watercare comprised of essential long lead items identified early on by the contractor (*Table 2*). This also allowed Watercare the opportunity to enquire internally and source items that were kept as spares or surplus on other projects. During this time local suppliers were contacted to confirm which items were in stock and what anticipated lead-times were for ordered products. Available equipment sourced directly from Watercare's stock yard included an existing pump that was planned for removal from another facility. It did initially require confirmation that the pump's duty range was appropriate for this system, which also expedited the pump selection for the additional pumps to be sourced for the final solution.

*Table 2: List of material and equipment acquired by Watercare*

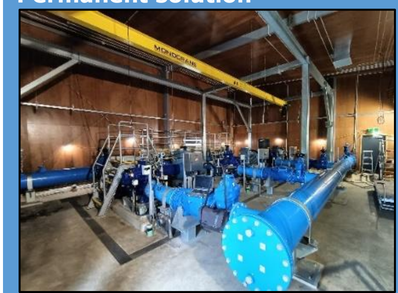
| Item | Quantity | Delivery |
|---|---|---|
| **Pumps** | | |
| Pump | 2 | Mid-March 2022 |
| Motor | 3 | Mid-March 2022 |
| Pump - Spare reused | 1 | **Existing Spare** |
| **Valves** | | |
| 400 RSG Valve | 4 | Late November 2021 |
| 375 RSG Valve | 3 | Mid-October 2021 |
| 300 RSG Valve | 7 | Late October 2021 |
| 100 RSG Valve | 2 | In stock with supplier |
| 80 RSG Valve | 1 | In stock with supplier |
| 400 NRV Surgebuster | 1 | In stock with supplier |
| 300 NRV Surgebuster | 4 | Early November 2021 |
| DN 300 Flowmeter | 2 | In stock with supplier |
| Grounding Disks | 2 | In stock with supplier |
| **Gearboxes** | | |
| 400 RSG Valve Gearbox | 4 | Late January 2022 |
| 375 RSG Valve Gearbox | 3 | Mid November 2021 |
| 300 RSG Valve Gearbox | 7 | Mid November 2021 |
| **Flanges** | | |
| DN 400 | 10 | In stock with supplier |
| DN 375 | 6 | In stock with supplier |
| DN 300 | 17 | In stock with supplier |
| DN 100 | 2 | In stock with supplier |
| DN 80 | 1 | In stock with supplier |
| DN 80 - Gillies | 1 | In stock with supplier |
| DN 300 Dismantling joint | 3 | Early October 2021 |
| **Pipe** | | |
| OD 508 - CLS | 10 x 12m lengths | **Existing Spare** |
| OD 406 - CLS | 7 x 12m lengths | **Existing Spare** |
| **Other** | | |
| Transformer - Vector | 1 | Mid-January 2022 |
| Electric Switchroom - Entec | 1 | Late January 2022 |
| Controls | 1 | **To be completed by Watercare** |

## 2.4 CONSTRUCTION

Packaging construction works into separable portions and agreeing on a cost reimbursable contract, allowed the contractor to establish on-site and commence with early works leading to the start of the immediate solution.

*Table 3* provides a summary of activities forming part of each separable portion. This also reflects the priority of elements needed to complete the immediate and final solutions.

*Table 3: Summary of work packages*

| Work Package | Scope |
| --- | --- |
| **Immediate solution**<br> | **Establishment**<br>• Site Clearance<br>• Earthworks and temporary batter<br>• Vehicle access |
|  | **Buried pipework**<br>• Valve Chamber construction<br>• Installation of buried pipework and valves outside building and passing through chambers<br>• Tie-ins to the existing Orewa 1 and 2 pipelines (to be boosted once pump station is commissioned) |
|  | **Critical structural and operational elements**<br>• Slab construction<br>• Aboveground manifold (suction & discharge) pipework passing over slab<br>• Install pump 1 (of 3)<br>• Place containerised switchroom<br>• Install and connect electrical supply (transformer and connections to switchrooms) |
| **Permanent solution**<br> | **Permanent pump station building**<br>• Pumps 2 & 3 installation<br>• Gantry installation<br>• Pump Station building and building services (acoustics, fire protection, ventilation)<br>• Permanent generator<br>• Landscaping<br>• Commissioning of pump station |

| Work Package | Scope |
| --- | --- |
|  | **Site structures and drainage**<br><br>• Retaining wall<br>• Site drainage and permanent driveway |
| **Decommissioning**<br><br> | **Decommissioning** of existing East Coast Pump Station |

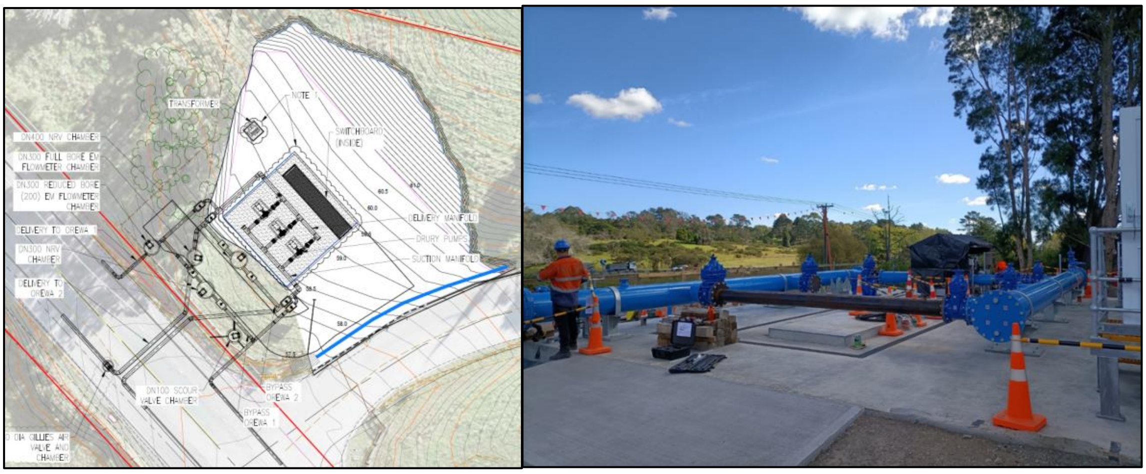



*Figure 7: Immediate solution (one operational pump)*

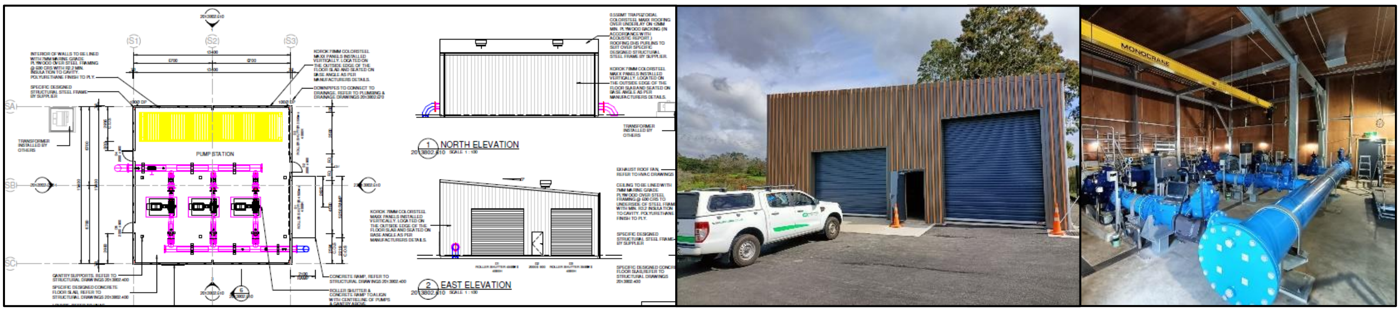



*Figure 8: Final solution*

# 3. PROJECT OPPORTUNITIES AND SAVINGS

The Project's overarching objective was to provide safe reliable drinking water to reliably meet the ongoing demand, and provide peak summer resilience. With a looming deadline, an alternative approach was required to deliver within a shorter than normal timeframe which resulted in opportunities and savings realised. These savings demonstrate a practical approach that can be adopted for similar projects. Although not revolutionary as individual savings, they provided a significant cumulative benefit in terms of time, cost and carbon savings. This further supports Watercare's 40:20:20 initiative (40% reduction in carbon emissions, 20% reduction in cost 20% year-on-year improvement in health, safety and wellbeing) and set's the expectation for every project to explore opportunities and challenge norms to improve cost, carbon and safety outcomes. Key practices adopted in this approach that reaped rewards are discussed in the subsequent sections.

## 3.1 CARBON REDUCTION

A carbon analysis was undertaken to compare the conventional delivery of a booster pump station to the constructed HBC PS. The carbon reduction realised at the end of construction was estimated at 25% (151,837KgCO2eq).

*Table 4: Key reductions from a conventional pump station to the HBC PS*

| Items | Conventional pump station | HBC PS | Carbon Reduction (kgCo2eq) |
|---|---|---|---|
| Pump Station Building | Heavy Weight Building<br>Ground improvements<br>Deeper foundations – Brick Cladding | Light Weight Building<br>Shallower foundations – mild steel | 33,092 (18%) |
| Equipment | 3 No. of Pumps & Motor<br><br>204m of Pipeline | 2 No. of Pumps and 3 No. of Motor ( 1 spare from existing pump station)<br><br>204m of surplus pipeline | 896 (17%)<br><br>67,983 (100%) |
| Site Layout<br><br>Earthworks and disposal of construction soil<br><br>Retaining Wall | All pipework and valve to be situated on a single RL with minimal slope.<br><br>Higher and longer retaining wall | Design incorporated into the existing ground slope – minimise earthworks. Valve chambers and pump stations on various RL.<br><br>Retaining wall height and length are minimised. | 2,320 (33%)<br><br>44,744 (23%) |
| Site Access (Surface) | Typically, concrete or asphalt across majority of the pump station site to ease vehicle access to all equipment. | Pump Station layout to minimise asphalt on site and opting for alternative materials such as mulching and | 5,524 (7%) |

| | | | |
|---|---|---|---|
| | | grass for infrequently accessed areas. | |
| Site Fencing | Fence around whole perimeter of the site | Fence around critical equipment | 2,325 (24%) |
| Off-site construction of containerised switch room | Switchroom within constructed in-situ within the building | Switchroom built off-site | 1,080[a] |

[a] Carbon saving for containerised switchboard is an estimate from Entec based on previous Waikato Fast50. Saving is mostly due to reduction in travel to site.

### 3.1.1 PUMP STATION BUILDING

The pump station building was designed as a lightweight structure allowing for the structure to be built on a shallow slab foundation. Savings (carbon, cost and H&S) were evident in the reduction of:

- Slab depth
- Ground improvements.
- Founding aggregate depth beneath the slab
- Weight of the building through selection of steel sheet, filled cladding
- Truck movements to transport the lightweight structure, as opposed to concrete trucks for in-situ pours.

It is understood that lightweight structures may not be applicable for all applications, as other considerations such as noise attenuation may require use of other materials in areas with low ambient noise levels (e.g. residential suburbs) or severe corrosive environmental conditions.

100% Recyclable composite timber battens were installed over the building cladding to improve asethetics.

*Figure 9: Completed lightweight structure (pump station building)*

### 3.1.2 USING EXISTING MATERIAL AND EQUIPMENT

A spare pump and motor from Drury Pump Station were used to service the immediate solution, this included an upgraded motor (increased power) for the final solution. Surplus concrete lined steel pipe from another project was also used for the inline pipework. These items contributed the greatest carbon reduction to this project and also provided cost savings which is further discussed in section 3.2.1.

### 3.1.3 EARTHWORKS AND SITE ACCESS

The selected site sloped at about 15%. In a conventional design the whole pump station site would have been reprofiled to be relatively flat with a significant retaining wall surrounding the site. This would provide more vehicle flexibility to access valve chamber and equipment on site. However at HBC PS, the earthworks were designed to minimise the volume of cut material and disposal off-site. This would also reduce the need for a longer and higher retaining structure.

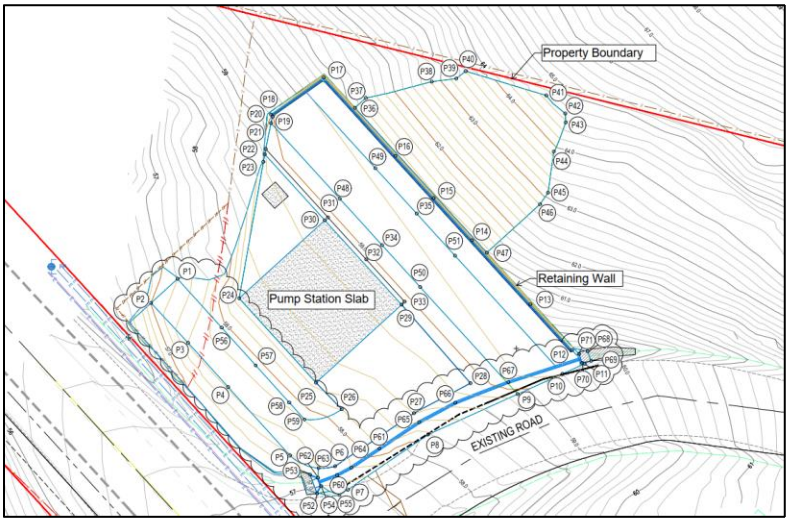



*Figure 10: Final site layout*

In the HBC PS, the asphalt was minimised to the site locations where heavy vehicles movement would occur and metalled areas for infrequently visited site areas and/or where light vehicles would require access (e.g. valve chambers). The remaining site was mulched or turf grassed. This reduced the area that would have been metalled and/or asphalted in comparison to conventional pump station.

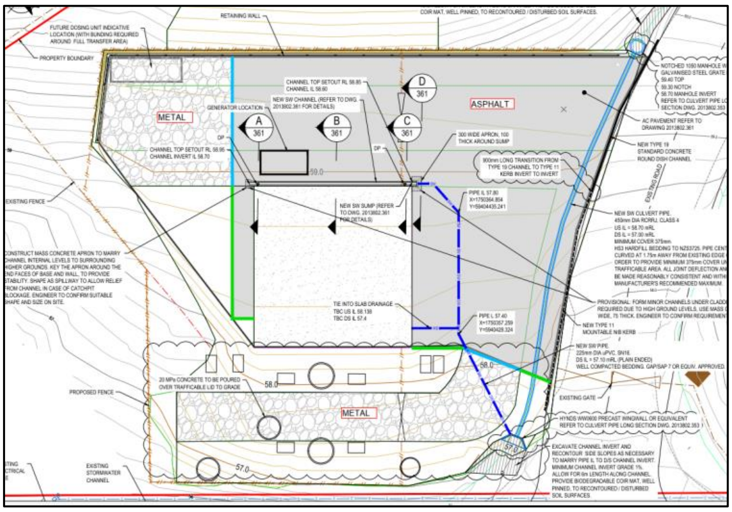


*Figure 11: HBC PS site access and finish site surfaces*

## 3.2 COST REDUCTION

The key items that contributed to cost reductions were:

- Using existing material and equipment (CLS pipe and spare pump): >1%
- Designing within permitted activity limits reduced the planning input and specialist assessments required: 1%
- Lower volume of earthworks with shallow building foundation and no ground improvements together with an accelerated delivery prorgamme: 3%

Cumulatively these savings add up to an overall reduction in cost of 5 % when compared to the approved, estimated budget.

### 3.2.1 USING EXISTING MATERIAL AND EQUIPMENT

The use of existing surplus material such as pipes and a spare pump allowed construction planning to progress. And although capital would have been expended for the initial purchase of these, it eliminated the risk of escalating costs and disruption from the covid-19 pandemic which unfolded during the project.

### 3.2.2 ACCELERATED PROGRAMME

Compared to the conventional approach, this Project effectively allowed for accelerated delivery which resulted the immediate solution was completed within 5 months from detailed design to construction, and the final solution 12 months following. This suggests a potential reduction of at least 13 months for the constructed immediate solution and 7 months for overall project respectively of a similar sized project.

Acknowledging that the site's zoning in conjunction with Watercare's status as a Council Controlled Organisation permitted most activities without the need for a consent. Where close communications with Auckland Council yielded a great collaborative output and prompt guidance on any uncertainties relating to the discretion of activities or the need for building consents of design elements. This approach may not be feasible for all projects, however it did challenge the team to review and define designs to fall within permitted limits which undoubtably also reduced the environmental impact to build the facility.

Reducing the construction timeframe also meant less day-to-day running costs (preliminary & general), which would translate into both a cost and carbon saving keeping in mind the site's electrical & fuel usage and ad hoc vehicle movements.

### 3.2.3 EARLY PROCUREMENT OF MATERIALS

Confirming the required equipment during the early stages of the Project supported the need for a Procurement Plan which enabled Watercare to purchase these critical items and progress the early works package. Although not predicted at the time, this de-risked the ongoing post-covid inflation experienced by the industry which saw an average increase in construtcion costs of over 15% between December 2020 and December 2021(1).

It should be noted that early procurement is not always practical, as one needs to consider availability of storage space, equipment warranties lapsing before actually being installed, and routine checks to avoid malfunction. An example of this would be purchasing a pump well before commissioning and needing to turn the shaft regularly in order to avoid flattening bearings.

## 3.3 IMPROVED SAFETY

To improve the safety of the project, there was a focus on minimising on-site hours. The hours on-site was estimated to be reduced by 5% compared to the total hours on site. The key items contributing to this is off-site production of containerised switchroom and parts of the pump station building.

### 3.3.1 OFFSITE PRODUCTION AND ASSEMBLY

Both the electrical switchroom and components of the lightweight structure were fabricated offsite. Having the switchroom manufactured and assembled offsite required careful planning and design coordination, but meant less personnel were required on-site for longer periods of time during construction.  The switchroom is estimated to reduce onsite construction hours by 864 hours mostly on road.

*Figure 12: Prefabricated switchroom placed at the site*

The selection of a lightweight structure over conventional in-situ concrete structure resulted in far fewer  vehicle movements on-site (50 fewer estimated by the Contractor).

The staged delivery of this project had no serious injuries documented which is further testament to the manner in which this project was delivered.

### 3.3.2 OPERATIONAL SAFETY

Valve chambers within the facility were located outside of clearly designated vehicle paths, allowing trenched pipework to be shallowed up as much as impossible to still allow valves and meters to be located belowground within chambers.

# 4. LESSONS LEARNT

The lessons learned during the project exhibit positive outcomes that can be reused in future projects and also challenges results from heavily focused design and construction delivery to fast-track similar projects.

## 4.1 OPPORTUNITIES THAT WERE UNDERTAKEN

The opportunities that were undertaken during the project which provided positive outcomes were:

- The selection of a site using a comparible existing pump station footprint to acquire the property
- Designing within permitted activities resulting in reduced approval times and resulting in savings
- Designing within building consent exemption limits (retaining wall height) with relative savings
- Design to fit available surplus equipment on hand such as the spare pump and pipes
- Maximising technical expertise by engaging specialist design and build contractors such as containerised switchroom and shed suppliers.
- Leveraging offsite production to accelerate construction through a parallel programme, and providing site safety benefits
- Setting clear expectations for design outputs during early contractor involvement
- Proactive and responsive design & technical support during the construction stage

## 4.2 LEARNINGS FOR FUTURE PROJECTS

Other learnings that were not able to be fully applied to the HBC PS but could be applied to future projects are:

- Early stakeholder engagement and proactive management for parallel property options
- Footprint of the pump station to consider the site access for maintenance and operations team during the site selection stage.
- Minimise major changes to processes which affects delivery such as digital delivery and offshore resourcing.
- Interface and gap analysis of multiple construction parties involved such as containerised switchroom and the electrical subcontractors, fire and security.
- Early engagement with commissioning team to successfully coordinate the construction of multiple parties.
- Confirmation and coordination of key dates with Operations and Commissioning team

- Carefull planning the interface between immediate and final solution such as the relocation of the containerised switchroom elements into the final solution e.g. fire, security and ventilation.
- Involvement of experienced key decision makers to unlock any roadblocks. Incorporating more construction support and risk-based monitoring hold points for this model of delivery.

# 5. CONCLUSIONS

The 27 MLD booster water pump station at Hibiscus Coast was successfully and efficiently delivered utilising an unconventional approach which involved key procurement and programme management initiatives.

The savings and learnings from this exercise provide a foundation & guidelines for many other projects within Watercare and also for other operators across New Zealand.

This approach can be easily replicated on many other projects across New Zealand required to meet forecasted demand and resilience requirements, while navigating the many uncertainties at times unecessarily associated with procurement and consenting delays. It contributes to infrastructure decarbonisation requirements and broader industry resource challenges.

Whether adopting any of the considerations mentioned above to accelerate challenging construction deadlines or focusing on savings from carbon, cost and health and safety outcomes; the overiding key to success is people.

Any new or non-traditional engineering or construction approach ultimately requires a highly collaborative, innovative and outcomes focused team to deliver a successful result to provide the required service to customers and stakeholders.

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