Australian Government
Department of Infrastructure, Transport, Regional Development, Communications and the Arts

Kingston and Arthur's Vale Historic Area Sewerage Scheme: Stage 2

Environmental Impact Statement: Appendices

March 2024

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KAVHA Sewerage Scheme: Stage 2

Environmental Impact Statement: Appendices

March 2024

Prepared for

Department of Infrastructure, Transport, Regional Development, Communications and the Arts

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Contents

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Appendix A:

Interim Works

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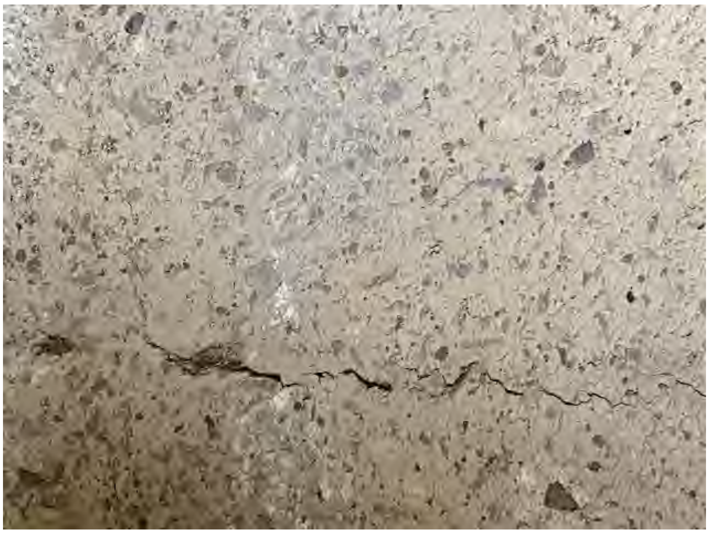
Appendix A: Interim Works

KAVHA Sewerage Scheme Interim Remediation Works (Tank Sealing) - Tanks before repair

Compound


Slaughter



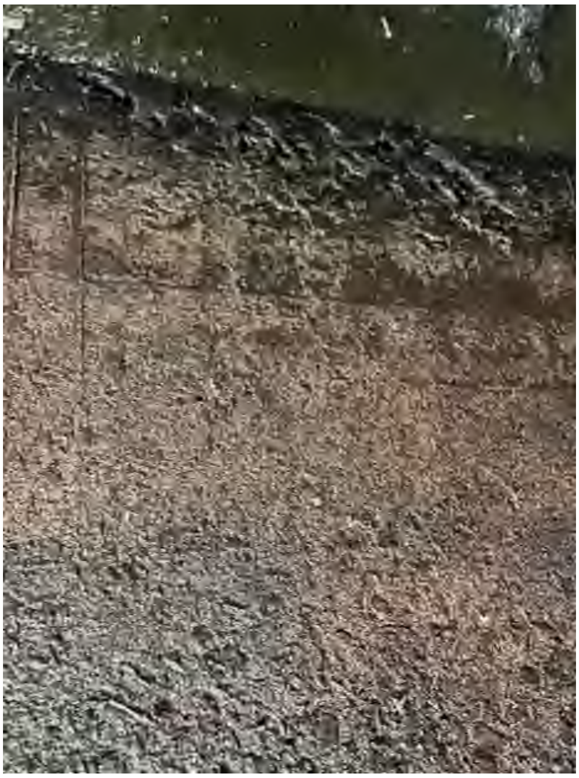

Emily


Pier Toilets




New Military Barracks

Number 11 Quality Row



Golf Club

Church

Cemetery

OMB Outside

OMB Outside

Number 10 Quality Row

Number 5 Quality Row

Number 8 Quality Row


EMILY BAY – Lone Pine



Number 6 Quality Row


Number 7 Quality Row

Government House – house – no photos provided

Government House – public toilets


Details of Interim Remediation Works - Sealing of septic tanks and sewage holding tanks

#	LOCATION	DIMENSION	CONDITION	RECOMMENDATIONS	WORKS UNDERTAKEN	Works Completed
1	LIONS CLUB	1600 long x 850 wide x 1200 deep	Poor	Immediate replacement of septic required.	Removed lids from septic. Pumped and cleaned out septic. Discussed options of replacing but due to area classed as high risk could not dig outside line of existing septic. Disconnected and capped off soaked trench. Collapsed in one wall of septic but left rest as had asbestos behind and was stable. Left floor in place. Drilled and pinned floor into walls. Boxed up inside septic and poured new internal walls. Deboxed and plastered septic. Laid mesh into floor and up walls to reinforce and fix into floor. Reinstalled existing lids and fitted pump out access. Fitted new inlet into septic. Turned water back on to Lions Club and check flowing in. Installed alarm and tidy up site	Works Completed, the existing tank was repoured to minimise heritage impact. Alarm Installed May 2021
2	COMPOUND	2100 long x 950 wide x 1200 deep	Poor	Immediate replacement of septic required. Or wash out and line septic walls and floor with PE100 or plaster.	Removed lids and fenced off area. Waterblast and vac inside tank to clean. Plaster tank. Refit lids. Install alarm system. This tank has been definitely leaking, many holes were found in the mortar lines. The soak trench line had attempted to of been capped of but once removing junction, it was found to of no been. This has now been sealed off.	Works completed. Alarm Installed January 2021
3	SLAUGHTER	1800mm dia x 1800 deep	Average	Replacement of holding tank to a larger size. Lining tank with a PE100 liner or plastering of tank.	Ladies Toilets - Remove lids and fence off area. Waterblast and vac inside tank to clean. Plaster tank. Refit lids. Install alarm system. This tanks was in reasonable condition, walls were crumbly and had started breaking down; mesh was showing in areas and gaps in the mortar joint between rings. It is expected this tank was also leaking. Mens Toilets- Plastered 2 septic tanks. Plastered with reinforcing mesh and sealed with silasec cement paint. Removed lids from both tanks and fence off area. Pumped out tanks, water blasted and vac out to dry. Investigated pipe leaked from septic to find heading to soak trench - capped and sealed pipe. Sealed tanks then plastered inserting reinforcing mesh and plastered over, sealed with silasec cement paint. Refitted the lids and opened up the toilets.	Works completed, except for the new lid , this has been made and waiting curing time to install. Alarm Installed January 2021
4	EMILY	Tank 1: 1300mm dia x 1200mm deep Tank 2: 1800mm dia x 1800mm deep Tank 3: 1300mm dia x 2250mm deep	Average	Replacement of holding tanks to a larger size single tank Lining tanks with a PE100 liner or plastering of tanks	Lifted lid from septic, pumped out and water blasted walls and floor until clean. Vac out all water to dry. Sealed tanks and plaster, inserted reinforcing mesh and plaster over. Sealed with silasec cement paint. Allowed to set and reopened the toiles.	Works completed February 2021 NOTE: the solar panels were removed from the alarms and trickle battery chargers installed instead after it was found the area was to shaded to allow enough charging of batteries
5	PIER TOILETS	1800mm dia x 1800mm deep	Average	Lining of tank with a PE100 liner or plastering of tanks	Removed lids and fenced off area. Waterblast and vac inside tank to clean. Plaster tank. Refit lids. Install alarm system. Upon plumbing out and cleaning this tank, the walls were found to be in worse condition than first thought. A crack was found in the floor, walls were found to be extremely crumbly with holes in the walls and joint between chambers. This tank was definitely leaking. Traced incoming pipework to find an overflow pipe; it was found to be running into an old buried septic beside this tank. Gained permission to expose it. It will be collapsed at a later date. This pipe has been capped off. Added extra protection to this tank by reinforcing plaster with steel mesh requiring extra plaster and then sealed with extra coats of silasec cement paint.	Works completed. Alarm Installed February 2021

Re

6	NEW MILITARY BARRACKS	2400mm long x 950mm wide x 1000mm deep.	Poor	Suggest urgent replacement of septic to a larger holding tank. Given proximity to Officers bath tunnel, suggest pumping out of tank on a daily working day basis to ensure tank does not overflow. Suggest a High level alarm be attached as a matter of urgency to ensure overflows is limited.	Dug around the lid and around down sides of the septic tank . Pumped out septic. Water blasted walls an floors and vac out to clean and dry, ready for plastering. Walls were found to be very crumbly with cracks, holes and roots growing into septic from bottom corner. Sealed tank and rendered, reinforced with mesh and painted on sealing coats. Refitted lid to septic and sealed on. Fitted checker plate lid to manhole.	Works Completed. Alarm Installed April 2021
7	NUMBER 11 QUALITY ROW	2400mm long x 900mm wide x 900mm deep.	Average	Suggest urgent replacement of septic to a larger holding tank. Soak trench to be capped off immediately. Suggest a High level alarm be attached as a matter of urgency to ensure overflows is limited.	Dug up to expose septic tank lid. dug around to expose the edges of lid. Prepared to lift the lid however, the broke on lifting. local company engaged to pour new lid. Pumped out septic, wash-down walls and vac dry and clean, preparing for plastering. dug up and disconnected the line to soak trench cap off. Plastered septic, sealed walls plastered with reinforcing mesh and sealed off with silasec/cement mix. Concrete lid was poured and boxed. Deboxed once set and cleaned up around the site. Fitted access pump out, pointed into Alum manhole lid and fixed over manhole.	Works Completed April 2021
8	GOLF CLUB	2 Tanks of same size 2400mm long x 900mm wide x 900mm deep.	Poor	Suggest urgent replacement of septics to a larger holding tank. Soak trench to be capped off immediately. Suggest a High level alarm be attached as a matter of urgency to ensure overflows is limited	Alarms have been installed to both septics. No work has been carried out to septics and the soak trenches are still connected. It was decided to leave trenches connected to avoid sewerage overflowing onto grounds at times of high short term use. The Alarms are working efficiently and response time from Norfolk Septic services is always in a timely manner.	Alarm Installed
9	CHURCH	2400mm x 900mm x 900mm deep	Average	Relining of tank with PE100 or plaster. Or Replacement of tank with larger. Install high level alarm to tank. Disconnect and cap off soak trench immediately	Dug up and exposed outlet of septic and capped off line to soak trench. Installed alarm system. No plastering of septic has been carried out	Alarm Installed
10	CEMETERY	1800mm dia x 1800mm deep	Average	Relining of tank with PE100 or plaster. Or Replacement of tank with larger. Install high level alarm to tank.	Removed lids from septic. Top section of septic ring collapsed in, check tank and found to be crumbly and cracked on entire of top ring. Discussed. Shut down toilets and supply portable toilets. Dug down to remove top ring to find base ring submersed in water. Discussed further and discovered that was sitting in seawater. Returned to find that base had floated and was lying to one side. Discussed further and shot heights to determine approx. high tide level. Remove floating septic base. and back fill hole. Source second hand septic ring. Dig out to allow to rings side by side so not sitting in water. Place base and ring into hole. Pour concrete to form base of septic ring. Connect sewer line from Shanes shed and public toilets. Install overflow line into second tank. Backfill around tanks. Source new lid for second tank and install. Install pre-existing lids to second tank. Install alarm.	Works Completed May 2021
11	OMB - Outside	2460mm x 900mm x 900mm	Poor	Cap off soak trench. Plaster or replace septic ASAP Would not recommend using until sorted. Maybe connected to courthouse toilets, will need access to confirm.	Fenced off area. Attempted to lift the lid. Access was cut into the lid. Water blasted and Vac inside tank to clean. Plastered tank. Tank found to be in extremely bad condition. Water was found to be flowing out of holes in floor, many cracks and holes in wall. This septic was leaking extremely badly. Cut aluminium sheet and bolted down to lid. Discussed options with condition of tank, plastered in steel mesh and sealed with silasec cement to give added protection.	Works Completed February 2021
12	OMB - inside	2400mm x 900mm x 900mm	Poor	Cap off soak trench. Plaster or replace septic ASAP Would not recommend using until sorted. Install high level alarm	Dug down to lid of septic and exposed it, dug along sides down below lid height. Pumped out septic. Washed out and vac to dry. Sealed walls of septic and plastered inserting reinforcing mesh. Sealed off with further coats of silasec. Allowed to dry. Repaired inlet junction into septic. Refitted lid and plaster. Fitted aluminium to manhole. Disconnected and plugged off line to soak trench	Works Completed April 2021
13	NUMBER 10 QUALITY ROW	1800mm Dia x 1800mm deep	Average	Ok for now, should last until stage 1. Install high level alarm	Commencing work on this today after soil samples show evidence of seepage. This tank was checked and appeared OK. Alarm has been installed	Works Completed

14	NUMBER 5 QUALITY ROW	2400mm x 900mm x 900mm	Average	Ok for now, should last until stage 1 Install high level alarm. Disconnect soak trench	Alarm has been installed. Dug down and exposed outlet to septic and capped off line to soak trench. Dig trench and install pump out line to fence for ease of access for NSS	Alarm Installed
15	NUMBER 8 QUALITY ROW	1300mm dia x 1150mm deep	Average	Ok for now, should last until stage 1 Install high level alarm Disconnect soak trench	Dug down and exposed outlet to septic and capped off line to soak trench. Dig trench and install pump out line to fence for ease of access for NSS. Septic is undersized and are currently waiting on GP services to pour a larger septic to replace. NSS are currently pumping this by alarm which is averaging every 1.5 days	Alarm Installed
16	EMILY BAY – Lone Pine	1800mm dia x 1800mm deep	Average good	Install high level alarm. OK for now, but recommend replacing tank with new PE tank in next year.	Checked condition of tank and all OK. Had been replastered Approx 6 years ago.	Alarm Installed
17	NUMBER 6 QUALITY ROW	2400mm x 900mm x 900mm	Average good	Install high level alarm. OK for now, will last until stage one.	Dug down and exposed outlet to septic and capped off line to soak trench. Dig trench and install pump out line to fence for ease of access for NSS	Alarm Installed
18	NUMBER 7 QUALITY ROW	3200 Litre Plastic tank	Good	Install high level alarm ASAP. OK for now, will last until stage one	no works undertaken	Alarm Installed
19	GOVERNMENT HOUSE - House	AQUA NOVA TREATMENT SYSTEM	Poor	Install high level alarm ASAP. Set up a maintenance schedule to inspect system every 2 – 3 weeks. This will ensure the system is working efficiently.	A new air pump and pump out pump was installed.	Alarm Installed
20	GOVERNMENT HOUSE – Public Toilets	2400mm x 900mm x 900mm	Poor	Install high level alarm. Disconnect soak trench Plaster septic.	Dig down and disconnected line to soak trench.	Alarm Installed
21	MUNNAS			The services this building previously provided for KAVHA staff are now met by relocation of the offices and kitchens to no.11 Quality Row. A working toilet and washbasin isn't needed for that proposed use.	No work has been carried out on this septic	
22	ALARMS			Install 22 alarm unit across KAVHA	Supply of SMS and Alarm box with float switch and solar.	Alarms Installed

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Appendix B:

Bligh Tanner Report (Section 2) - Options considered

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2 OPTIONS

The table below presents the several opportunities for the treatment or management of the polluted water.

Option	Option	Commentary	Implementable before summer	Effectiveness at protecting Emily Bay
Interception	Groundwater dam	This prevents the intrusion of polluted groundwater by installing an impermeable sheet or bentonite filled trench to limit the flow of groundwater into Emily Bay. In isolation, this measure would lead to raised groundwater levels and so would need to be coupled with a treatment and disposal measure. This option would require excavation works within KAVHA which could involve complex and lengthy approvals, although the finished works would be largely invisible. Appropriate erosion and sediment control should prevent the large release of sediments into the bay during construction.	N	M
Treatment	Package Plant	Several containerised water treatment plants are capable of advanced nutrient removal and producing water of suitable quality for release. A key challenge will be the transportation and delivery of the package plant. The plant would be most effective treating a consistent flow of water and may not provide effective treatment in larger storm events. Treated water would likely need to be used for golf course irrigation and any excess discharged into the bay. It could also be used to treat wastewater from the KAVHA properties.	N	H
	Denitrification trenches	An experimental technology which passes water through a carbon rich, anaerobic trench. This water completes the dentification cycle and converts nitrates and ammonia to nitrogen gas. Trials in Queensland sugarcane farms show promising results, with up to 44% nitrate removal efficiency and averaging 3.4g/m³/day nitrate with a 2.5 hr residence time. The CLMP notes an issue with excess Norfolk Pines in KAVHA, so those trees could be used as the source of woodchips. This option would require excavation works within KAVHA which could involve complex and lengthy approval, although the finished works would be largely invisible.	N	M

Wetland	A portion of the Kingston Commons or Lowlands areas could be re-established as wetlands, similar to pre-European settlement. This wetland will be able to treat surface water from the upstream catchment and provide some detention to prevent uncontrolled release of freshwater into the bay. Groundwater could also be pumped and circulated through the wetland. A wetland would also take up to two years to establish, and water quality performance is variable. The CRC Water Sensitive Cities recently reported that it is unclear whether constructed wetlands effectively remove a significant amount of nitrogen from stormwater over time. This option would require excavation works within KAVHA which could involve complex and lengthy approval.	N	L
Nualgi/diatomix	There are a range of proprietary products that can be used to stimulate diatom growth in water bodies, thereby drawing down nutrient levels and limiting nuisance algal growth. There is limited data on the efficacy of treating larger scale waterbodies or more complex ecological systems, as these are commonly used in ornamental ponds. Parks Australia believes that this option would trigger an Environmental Impact Assessment. This treatment could be applied to the existing ponded water at KAVHA, and groundwater could also be pumped and circulated through the waterbody prior to release. It would likely be a relatively cheap measure with limited side effects, and could be implemented quickly as a short-term no-regrets measure. The product comes in 5 L jerry cans, and needs to be continually dosed. Assuming a dosage of about 5 l/week based on suppliers estimates, the cost would be about $1,000/week. A solar powered automated dosing system costs about $10,000 ex Brisbane.	N	Unknown
Macro algae	Remediation of wastewater by macroalgae is a process whereby a suitable species of freshwater algae are deliberately grown to remove nutrients (nitrogen and phosphorus) from contaminated water. There are some recent full scale trials (for example at Home Hill in Burdekin Shire Council) where a particular species of macroalgae (believed to be Oedogonium) is being used to remove nutrients from secondary treated wastewater to minimise the export of nutrients to the Great Barrier Reef. Our concept would be to construct a temporary pond through which water	N	M

		is circulated to "feed" the algae. Treated water could be directly discharged to the reef lagoon or recirculated within the wetland. Algae when grown can be used as a fertiliser or sent to landfill.		
	Aeration	This is a strategy that is often implemented in ponds in urban cities, although their ability to reduce nutrient concentrations is not well studied. It is unlikely that much denitrification would occur and so the benefits to Emily Bay are likely to be limited. This option would require a pump to operate.	Y	L
Disposal of surface / groundwater	Golf course	There is over 10 ha of turf that could be irrigated. Care would be required to ensure that no ponding or runoff occurs. Deep drainage could still discharge into Emily Bay and Cemetery Bay, which anecdotally remains in good condition. Public access presents a significant limitation to this option (the club may need to close). NIRC will need to produce an agreement contract with the property owner.	N	H
	Plantation	Two plantations totalling 7 ha have been identified near Rooty Hill Road and Country Road, which will have high potential for water uptake. Consideration into effluent storage will be required. Low public exposure. PFAS mobilisation was flagged as an issue. NIRC will need to produce an agreement contract with the property owner. It is recommended for MEDLI modelling to be undertaken to better understand the impacts of irrigation with effluent on the underlying soils and groundwater.	N	H
	Emily Bay tidal release	The outfall will need to be placed deep underwater to ensure that sufficient dilution occurs and will need to withstand ocean currents. Likely to have significant implications on design and cost of outfall. If progressed, it is recommended that a coastal engineer be engaged to provide technical advice regarding the feasibility and engineering requirements of the outfall to prevent the risk of backwashing into Emily Bay or impacting on adjacent marine environments.	N	M
	Irrigation of airport green space	Excess runoff could be managed by irrigating the surrounding land (2 ML over 20 ha). This does not provide substantial improvements to water quality, and percolation into the groundwater system may still discharge into the bay.	N	H

		As elevated levels of PFAS have been detected adjacent to the airport, there is a risk of mobilising PFAS with irrigation. Low public exposure. It is recommended for MEDLI modelling to be undertaken to better understand the impacts of irrigation with effluent on the underlying soils and groundwater.		
	Headstone Reserve discharge	Environmental Authority could allow for emergency release jurisdiction. The existing ocean outfall allows for the rapid dilution of polluted water. Reduced environmental risk.	N	H
Preventative Measures	Leaky weir system	As recommended in *Water Quality in the KAHVA Catchment,* leaky weir systems could be installed downstream of Watermill Dam. This would help attenuate surface runoff, promote infiltration and minimise waterway erosion, thereby reducing sediment loads (not noted as a pressing issue). The benefits to Emily Bay are likely be modest, as polluted water infiltrating into the groundwater would still ultimately discharge into the bay, and there is no evidence to suggest much nutrient attenuation would occur within the groundwater system. This option is permitted under the existing Cultural Landscaping Management Plan.	Y	L
	Septic tank pump out	There is potential for septic tanks to be frequently pumped out and transferred to the STP, which will reduce land disposal and prolonged system leakages. There are currently two 2.5 kL pump out trucks on the island, and Council estimates that there are 138 properties that discharge near Town Creek. Conversations with local operators suggest that these tanks could be emptied within a fortnight, assuming ten pump outs per day. We have also estimated that each septic tank would reach full capacity in ten days. This means that this pumping regime would be very time sensitive and have minimal allowance for delays. Importing additional trucks is recommended to increase pump out capacity. This strategy does not address the existing body of polluted water in the Town Creek Wetland. There is also likely to be a significant lag between starting the pump out scheme and observable improvements in water quality in Emily Bay due to existing groundwater contamination. Future assessment of logistics and operating costs and CO_2 emissions is recommended.	Y	M*

	Extend sewer network		N	H*
	Upgrade STP		N	H
Other	Flushing of Emily Bay	There is already nutrient rich water in Emily Bay as shown by the deterioration of the reef. The Draft SIMS report found “evidence of high seawater turnover within the Slaughter and Emily Bay lagoons, with low residence time, high tidal variation (at time of survey) and connectivity between the inshore and offshore lagoonal waters.” A pumping system that transfers this water beyond the reef where it might be dispersed by ocean currents (or conversely, pumping cooler cleaner water from offshore to displace the warmer, polluted water) could mitigate this issue. The volumes of water would be substantial although the pumping head is low. The system would involve significant technical investigations to determine its feasibility, including understanding coastal dynamics, pipeline and pumping system design.	N	Unknown

**Significant lag in water quality improvements expected*

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Appendix C:

KAVHA Sewerage Scheme Stages 2 and 3: Concept Design and Construction Plan

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Australian Government - Department of Infrastructure, Transport, Regional Development, Communications and the Arts

Kingston & Arthur’s Vale Historic Area Sewerage Scheme Stages 2 & 3

Concept Design and Construction Plan

November 2023

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Australian Government - Department of Infrastructure, Transport, Regional Development Communications and the Arts

Kingston & Arthur's Vale Historic Area Sewerage Scheme Stages 2 & 3 Concept Design & Construction Plan

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Issue Date	Revision No.	Author	Checked	Approved
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23-09-2023	2	EB	AS	AS
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Date: 8 November 2023
Reference: RP 23-11-08 000770 EB.Docx

Australian Government - Department of Infrastructure, Transport, Regional Development, Communications and the Arts

Kingston & Arthur's Vale Historic Area Sewerage Scheme Stages 2 & 3 Concept Design and Construction Plan

APPENDICES

APPENDIX 1
Stage 2 and 3 Wastewater Scheme Drawings and Pumping Station Drawings

APPENDIX 2
ESCP Drawings

APPENDIX 3
Aquatec Controller Information

APPENDIX 4
Parsons Brinkerhoff Geotechnical Report

1.0 Background

The Kingston & Arthur's Vale Historic Area (KAVHA) area is located on the southern coast of Norfolk Island and is a popular tourist destination for people visiting the island.

A new wastewater scheme has been designed to replace old septic tanks and failing disposal fields in the KAVHA area with a pressure sewer system that pumps all the wastewater up Country Road and Taylors Road and feeds into the Norfolk Island Water Assurance wastewater network near Queen Elizabeth Avenue.

Stage 1 of pressure sewer wastewater scheme has been designed and is currently being built to convey wastewater from the properties located along Quality Row towards a collection point at the junction of Quality Row and Middlegate Road.

This report has been prepared to identify Stages 2 and 3 of the scheme, which allows for more wastewater to be collected from buildings located near Kingston Pier, the cemetery and Lone Pine public toilets and a portion of Middlegate Road and to pump the flows up Country Road and Taylors Road to the Norfolk Island Water Assurance wastewater network. The design has also allowed for the incorporation of wastewater flows from properties located along the Country Road / Taylors Road / Middlegate Road route to also be able to connect to the scheme using their own pressure sewer pumping stations.

Plans showing the extent of the Stage 2 pipelines are presented in Figures 1.1 (yellow line) and 1.2 (orange line). A plan showing the extent of Stage 3 pipelines is presented in Figure 1.3 (red line).

The design plans upon which this management plan is based, are attached in the Appendices.

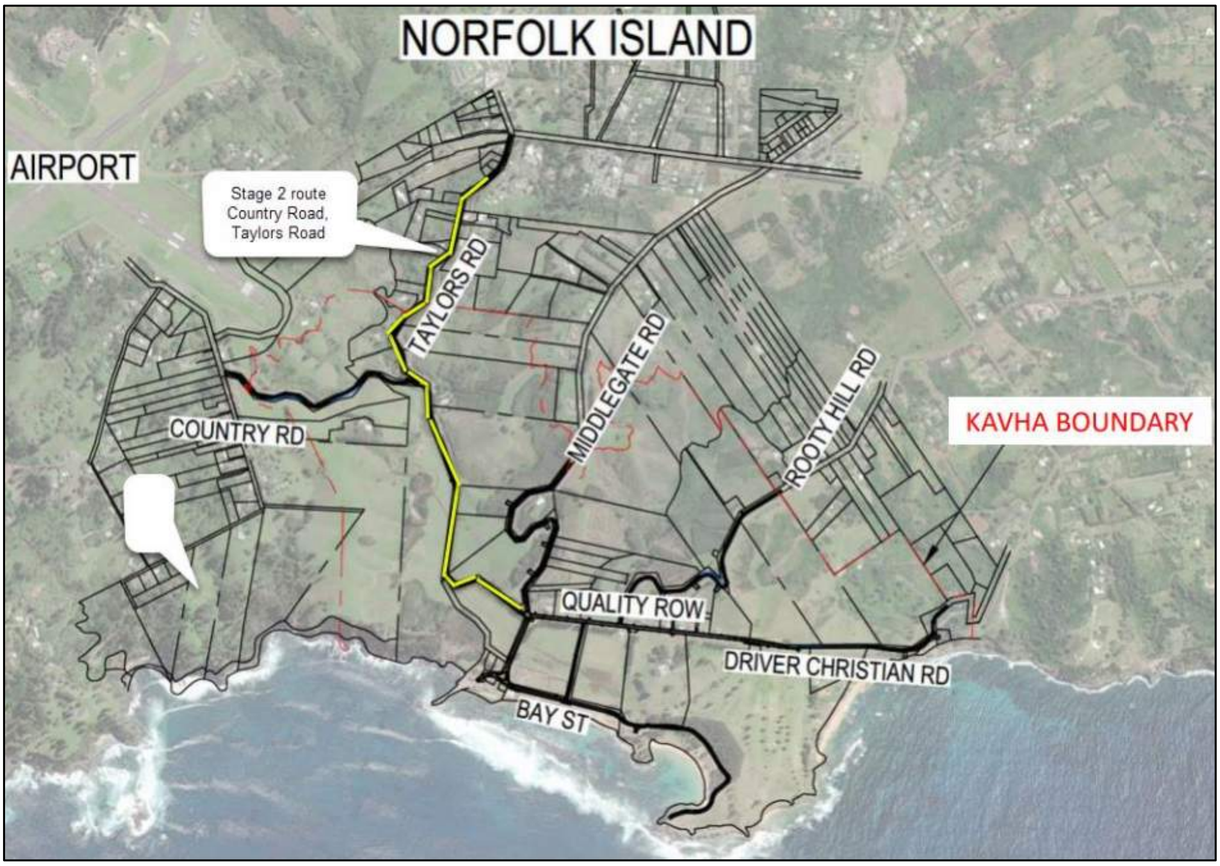

Figure 1.1: KAVHA Wastewater Scheme - Stage 2 - Country Road and Taylors Road

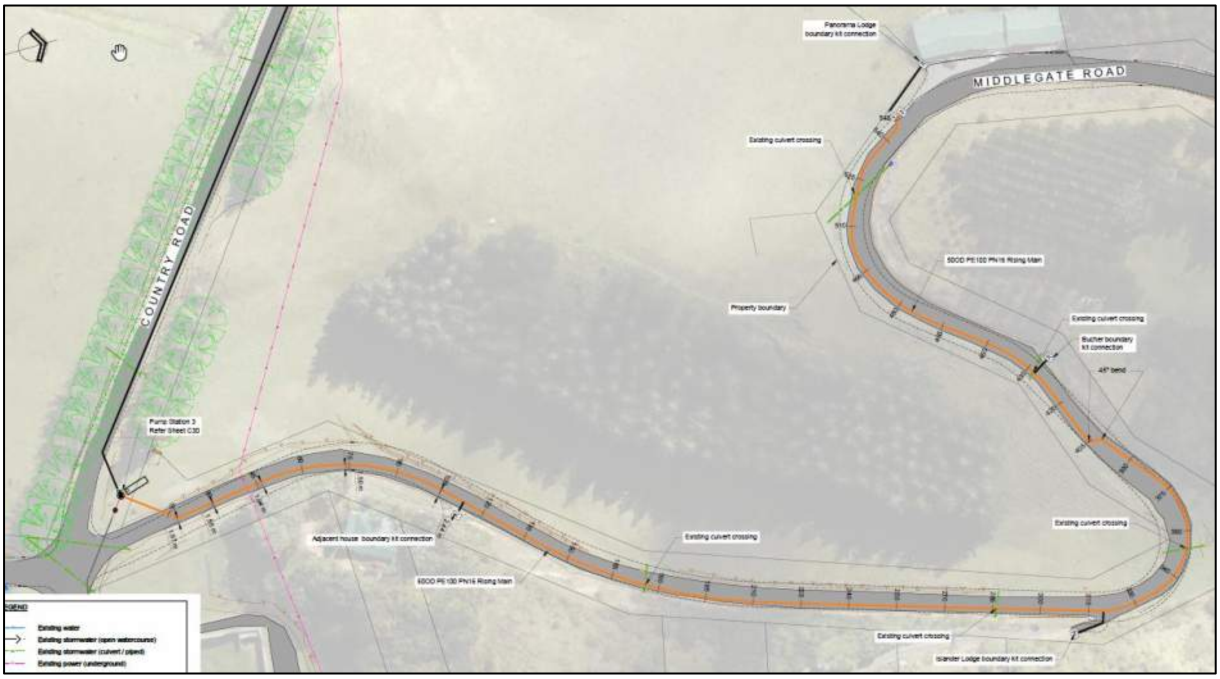

Figure 1.2: KAVHA Wastewater Scheme - Stage 2 - Middlegate Road

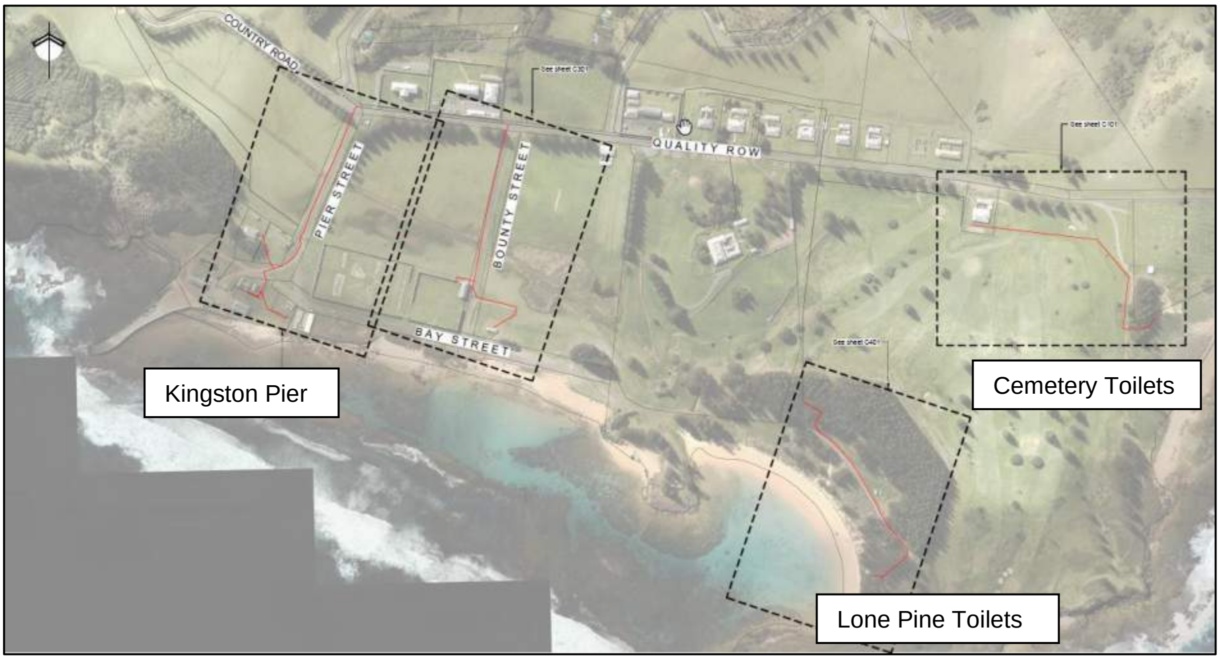

Figure 1.3: KAVHA Wastewater Scheme - Stage 3

2.0 Introduction

2.1 General

Stage 1 of the KAVHA wastewater upgrade works has involved decommissioning of existing old septic tanks for the properties along Quality Row and installation of a pressure sewer system to replace them. The Stage 1 works finished at the intersection of Middlegate Road and Quality Row at holding tanks. These works have already been approved and are currently being built with the exception of the holding tanks which will be replaced by Pumping Station 3 (PS3) and its associated underground emergency storage tank. Stage 1 is not addressed in this report.

As noted above, Stages 2 and 3 extend the overall wastewater scheme boundaries and allow the collected wastewater to be pumped up Country Road and Taylors Road to the Norfolk Island Water Assurance wastewater network near Queen Elizabeth Avenue including the future integration of wastewater flows from adjacent properties along the rising main route.

Works involved with Stages 2 and 3 are the subject of this Concept Design and Construction Plan (CDCP).

2.2 Stage 2

Stage 2 of the scheme mainly involves the transfer of wastewater collected in Stage 1 (and Stage 3 as described below) using four pumping stations in series to pump the flows up Country Road and Taylors Road to an existing Norfolk Island Water Assurance wastewater manhole near Queen Elizabeth Avenue as shown in Figure 1.1. The pipeline has been designed to incorporate additional wastewater flows from 19 adjacent properties, however, their connections are not part of the physical works for this project.

A pressure sewer pipe in Middlegate Road will also be laid as part of the Stage 2 works as shown in Figure 1.2, however again, the four private properties that this pipeline will service will need to be connected in the future and are not part of this project.

Detailed design drawings of Stage 2 of the scheme are presented in the Appendices.

2.3 Stage 3

Stage 3 works of the scheme involves the decommissioning of existing onsite septic tanks for the properties in the Kingston Pier area as well as the Lone Pine and Cemetery public toilets and installation of an extended pressure sewer system to replace them.

The Stage 3 works connect to the Stage 1 pressure sewer system to allow the Stage 3 properties wastewater to also be pumped up to the existing Norfolk Island Water Assurance wastewater manhole near Queen Elizabeth Avenue via the Stage 2 trunk rising main and pumping stations.

The route and extent of the Stage 3 pipelines are shown in Figure 1.3. Detailed design drawings of Stage 3 of the scheme are also presented in the Appendices.

2.4 Introduction Summary

This CDCP report presents the proposed design and construction management for the Stages 2 and 3 of the KAVHA wastewater scheme.

This report provides the following:

- Design details
- Construction management plan incorporating:
  - Operational Environmental Management Plans
  - Decommissioning Plan (DP)
  - Waste Management Plan (WMP)
  - Erosion and Sediment Control & Soil Management Plan (ESCP & SMP)

3.0 Objectives

The objectives of the CDCP are as follows:

3.1 Design Concept

The objective of this section is to articulate the design concept for both Stages 2 and 3, and to present the proposed works in the context of proximity to natural and built heritage features and other items of environmental importance. This includes the placement of works in relation to the surrounding environment, and detail around the depth of excavation and materials use where known.

3.2 Construction Plan

The objective of this section of the report is to present construction methodologies and identify preliminary mitigation measures for risks associated with the environmental or heritage areas to inform the Environmental Assessment of the works.

The objectives of the Construction Plan are presented through the following sections:

- Preliminary Identification and Mitigation of Construction Impacts
- Preliminary Identification and Mitigation of Operational Impacts
- Decommissioning Plan and Waste Management Plan (DP & WMP)
- Erosion and Sediment Control Plan (ESCP)
- Soil Management Plan (SMP)

3.2.1 Preliminary Identification and Mitigation of Construction Impacts

The purpose of this section is to:

- To present a construction methodology including a description of the design, the construction components and materials to be used, including any staging of works.
- To assess the potential of possible environmental risks associated with construction.
- To present preliminary construction management strategies and mitigation measures for reducing severity of risks and reducing the potential impact of those risks to inform the Environmental Assessment of the works.

3.2.2 Preliminary Identification and Mitigation of Operational Impacts

The purpose of this section is to:

- To assess the potential risk of possible operational failures.
- To present preliminary management and mitigation measures for reducing severity of risks and reducing the potential impact of those risks to inform the Environmental Assessment of the works.

3.2.3 DP & WMP

The purpose of the DP & WMP is to:

- To present a methodology for decommissioning the existing septic tank systems.
- To present management and mitigation measures for reducing potential impacts of decommissioning the existing septic tanks and associated infrastructure.
- To present a methodology for managing construction related waste.
- To present preliminary management and mitigation measures for reducing potential impacts of construction related waste to inform the Environmental Assessment of the works.

3.2.4 ESCP

The purpose of the ESCP is to:

- To assess the potential risk of surface water run-off from the site entering any waterway or the Norfolk Marine Park.
- To present preliminary management and mitigation measures for reducing the severity of any erosion or sediment transport risks and reducing the potential impact of those risks to inform the Environmental Assessment of the works.

3.2.5 SMP

The purpose of the SMP is to:

- To assess the potential risks associated with soil disturbance, the management of contaminated soil (human waste, acid sulphate soils), disposal and importation to and from construction site and the Watermill Dam hardfill area.
- To present preliminary management and mitigation measures for reducing the severity of any soil management risks and reducing the potential impact of those risks to inform the Environmental Assessment of the works.

4.0 Document Criteria and Guidelines

Appropriate guidelines and information material have been followed in the preparation of this CDCP. These include:

- The Environment Protection and Biodiversity Conservation Act 1999.
- Risk Assessment criteria ISO 31000:2009.
- Water Services of Australia - Sewerage Code of Australia.
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004).
- Managing Urban Stormwater - Soils and Construction Volume 2a - Installation of Services (Landcom 2008).
- Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines v4.0.

A full list of references is included in Section 13.

5.0 Existing Environment

5.1 Introduction

The Stage 2 construction is located along Country Road, Taylors Road and Middlegate Road. Stage 3 construction is located in the Kingston Pier area, the Cemetery and Golf Course areas and the Lone Pine / Emily Bay area.

The site surroundings include both built and natural heritage features, established Norfolk Pines, open grass areas, public access tracks, sealed public road and adjacent beaches.

Construction potentially crosses locations where Acid Sulphate Soils (ASS) are present in two areas.

A description of the built and natural heritage items, and Acid Sulphate soils are presented in this section.

5.2 Stage 2 Existing Environment

Stage 2 works follow the Country Road, Middlegate Road and Taylors Road roadways. All of the Stage 2 works are located within the road corridor boundaries. The pipeline routes are shown in detail in the drawings presented in the Appendices.

Features of interest in the vicinity of works are as follows:

- Sealed roads
- Watermill Dam
- Stormwater Culverts
- Norfolk Pine Trees
- Overhead and underground power lines
- Overhead and underground telecom lines
- Areas of potential ASS in the Watermill Creek and associated wetland next to Country Road.

5.3 Stage 3

Stage 3 works are located in four key areas within KAVHA historical area:

- Bounty Street, Slaughter Bay public toilets, Prisoner Barracks, Sirius Museum building and historic walls.
- Pier Street, historic Surgeons Quarters and Convict Hospital, REO building and Pier Store and Norfolk Island Museum, Munnas and associated buildings.
- Emily Bay and Lone Pine public toilets and the road between.
- Norfolk Island Golf Club and land adjacent to the Norfolk Island cemetery.

The pipeline routes are shown in detail in the drawings presented in the Appendices.

Features of interest in the vicinity of works are as follows:

- Sealed and unsealed roads
- Watermill Creek
- Wetlands associated with Watermill Creek
- Stone Culverts
- Historic Buildings
- Built historic features and ruins
- Proximity to coastal areas
- Areas of potential ASS in the Watermill Creek and associated wetland passing under Pier Street and Bounty Street.

Photographs of various locations associated with Stages 2 and 3 works are presented in Figures 5.1-5.6 below.

Figure 5.1: View of Watermill Creek

Figure 5.2: View of Country Road adjacent to the Watermill Dam

Figure 5.3: View of Mid-section of Taylors Road - North of PS5

Figure 5.4: Pier Street and Culvert and Watermill Creek

Figure 5.5: View of Emily Bay Toilet Block Set in Pine Forest behind Emily Bay

Figure 5.6: View behind REO Building looking towards Kingston Pier

5.4 Soils

Norfolk Island has an area of 35.7km^2 and is largely comprised of basaltic rocks and tuffs that are deeply weathered, with rich and highly permeable soil, suitable for a wide range of cropping.

Six types of soil occupy the majority of the island and are formed from late Tertiary basalt flows with interbedded ash and tuffs. These soils all have firm strongly structured surfaces with rapid surface infiltration, and no impeding subsurface layers.

Erosion is evident on Norfolk Island from three processes, soil creep, slumping (land slips) and sheet erosion, contributing to infill in lower parts of the landscape and drainage lines.

Soils have clay textures (>35% clay) throughout the profile, and with compaction would be suitable for earth embankment gully dams.

5.4.1 KAVHA Soils

Soils in the area of the proposed works are identified by Parsons Brinkerhoff in their report *Norfolk Island Report on Geotechnical Soils Investigation 2005* in Figure 5.7 below.

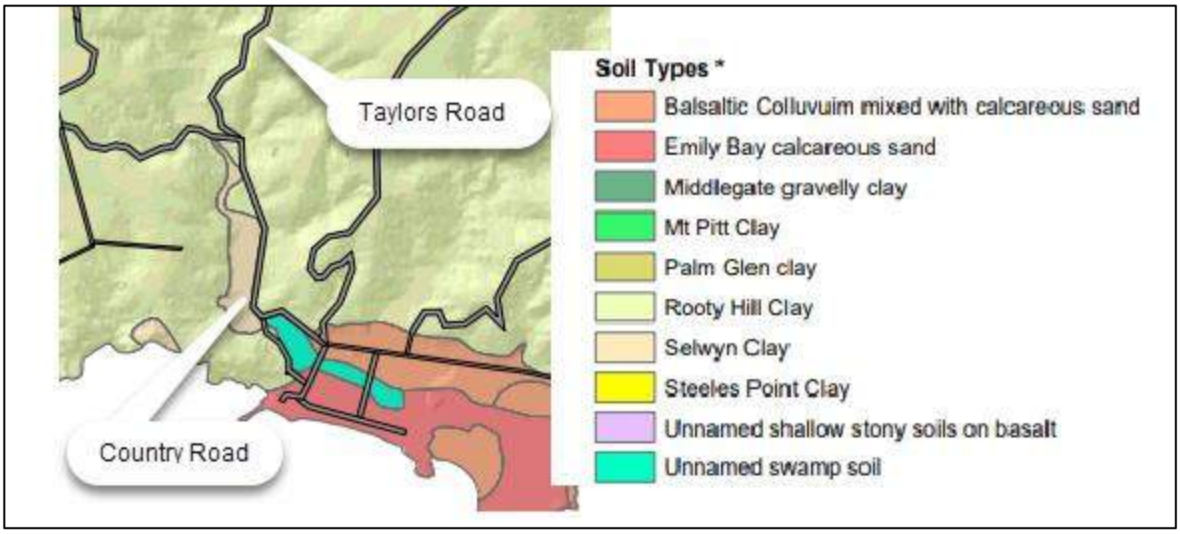

Figure 5.7: Soil Types in Vicinity of Works (extracted from Parsons Brinkerhoff Report)

Soils encountered in the upper reaches of Stage 2 include Rooty Hill Clays and Selwyn Clays.

Soils encountered in the lower reaches of Stage 2 Country Road include unnamed swamp soils, and in Stage 3 include Balsaltic Colluvuim mixed with calcareous sand, and Emily Bay calcareous sand.

A copy of the Parsons Brinkerhoff report is attached in the Appendices.

5.4.2 Acid Sulphate Soils

Norfolk Island has numerous small areas of some of the most acidic soils in the world. Acid sulphate soils are naturally occurring soils, unconsolidated sediments or organic accumulations (peat) in which sulfuric acid may be produced or has been produced when the soils are drained or exposed to oxygen. They are formed under waterlogged (anaerobic) conditions in peaty wetlands in some areas on Norfolk Island.

Acid Sulphate soils can result in localised environmental degradation in drying wetlands and in long-term degradation of infrastructures such as dam walls and culverts.

Figure 5.8 below presents the site location and local soil categories. Red dotted lines have been superimposed on the soils map to show the proposed pipeline routes in those areas. The blue shaded area identifies swampy soil areas that are understood to potentially contain some acid sulphate soils.

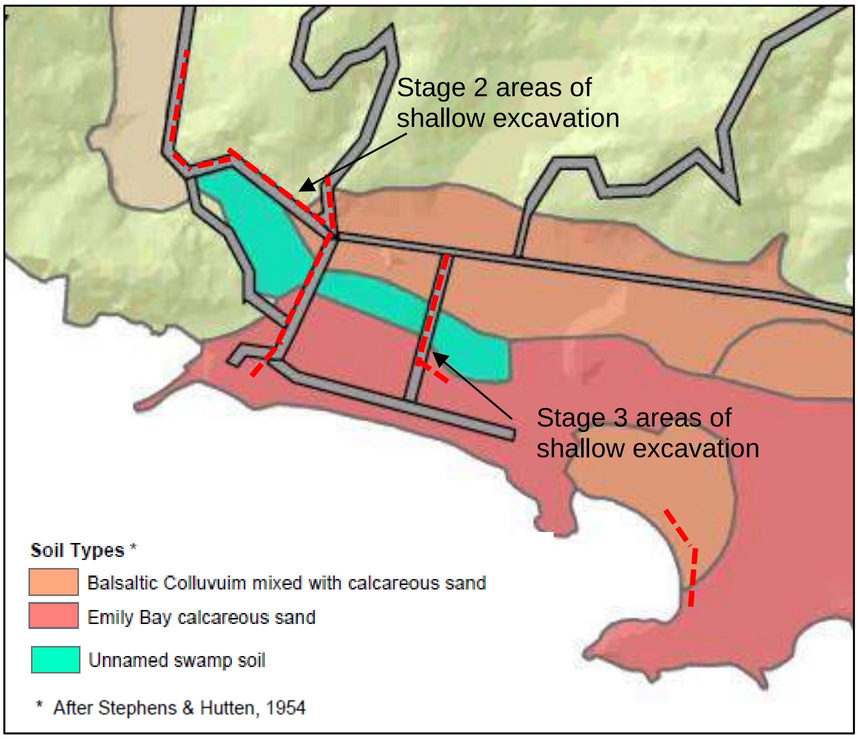

Figure 5.8: Soil Types - Extracted from Parsons Brinkerhoff Norfolk Island Report on Geotechnical Soils Investigation 2005

There is the potential of encountering acid sulphate soils during excavations in both Stages 2 and 3.

Sulfuric organic soils on Norfolk Island can become extremely acidic such that few aquatic animals and plants can survive. Their presence can reduce farm productivity and animal productivity because the acid discourages good quality pasture.

Grazing animals may take in too much aluminium and iron by feeding on acid-tolerant plant species and by drinking acid water. Sulfuric organic soils may also make farmland more prone to salinity and waterlogging. If sulfuric acid is washed into waterways it can kill fish and aquatic plant species.

ASS can damage infrastructures. Fitzpatrick notes that the drought conditions of 2020 led to a drop in water table levels and exposed ASS soils and corrosive damage. Damage to the Watermill Dam and several culverts within KAVHA was identified as presented by Fitzpatrick Photographs in Figure 5.9. The photos show the following:

Photographs a & b: The exposed corrosion / dissolution of cement mortar and calcarenite used in the construction of dam walls at Watermill dam.

Photographs c and d: Pier Street culvert in February 2020 during the drought / dry period.

Photographs e and f: Watermill dam filled with water and underlying black Subaqueous monohypersulfidic organic soil.

Photographs g and h: Pier Street culvert showing abundant high reeds with saturated hypersulfidic organic soils in December 2021 during the wet period.

Figure 5.9: Images of Structures in KAVHA
Extracted from *ASS Fact Sheet For Norfolk Island,* Fitzpatrick, February 2022

5.5 Heritage Areas

The KAVHA area is a UNESCO World Heritage site.

Pipelines are to be laid in the sealed roadways such that the ground that is being excavated has already been disturbed in the construction of the roads.

The pipeline works for Stage 2 follow the sealed road alignments of Country Road, Middlegate Road and Taylors Road. Pumping Stations PS3, PS4, PS5 and PS6 will be located in the road verges but still within the road reserves.

The built heritage in the Stage 3 area located near Kingston Pier is shown in Figure 5.10 below.

Figure 5.10: Stage 3 Historic Features in the Kingston Pier Area

Stage 3 works are also located near the Norfolk Island Cemetery and Golf Club and pipelines cross historic stone culverts on Pier Street and Bounty Street - see Figure 5.4 showing the Pier Street culvert.

5.6 Waterways

Stage 2 of the works does not cross any waterways, however the pipelines cross stormwater culverts as shown on the drawings presented in the Appendices.

As noted above, two pipeline sections will cross Watermill Creek at Pier Street and Bounty Street in the Stage 3 works. However, the pipes will be laid in the road pavements on top of the culverts and hence have minimal impact on the creek below. Any risks to and impacts to Watermill Creek are presented in Section 8.

5.7 Norfolk Marine Park

Emily Bay and Slaughter Bay are part of the Norfolk Marine Park which has significant biodiversity and natural heritage values.

All works for Stage 2 are located well away from the Norfolk Marine Park.

Works for Stage 3 are 20m away from the Slaughter Bay seawall at their closest (behind Munnas). Only one area is closer to the sea which is the excavation required to install the pumping station for the Lone Pine toilets which is 10m away from the Emily Bay beach.

5.8 Impacts of Construction Activities

The construction methodologies and mitigation methods described in the following documentation take all the factors described above into consideration to limit any impacts on the environment.

6.0 Design, Construction and Operation of the Wastewater Scheme

6.1 General

As noted above the new wastewater scheme has been designed to replace old septic tanks and failing disposal fields in the KAVHA area with a pressure sewer system that pumps all the wastewater up Country Road and Taylors Road and feeds into the Norfolk Island Water Assurance wastewater network near Queen Elizabeth Avenue.

The location and extent of Stages 2 and 3 of the scheme are shown in Figures 1.1, 1.2 and 1.3. The overall extent of the scheme and the location of the four proposed trunk sewer pumping stations is presented in Figure 6.1 below.

The logistics of materials delivery to Norfolk Island, the construction methodology, the potential presence of acid sulphate soils, and the proximity to natural and built heritage areas have all been taken into consideration in the design. Furthermore, the operation of the scheme has been considered such that components are easy to maintain, fit for purpose and readily available.

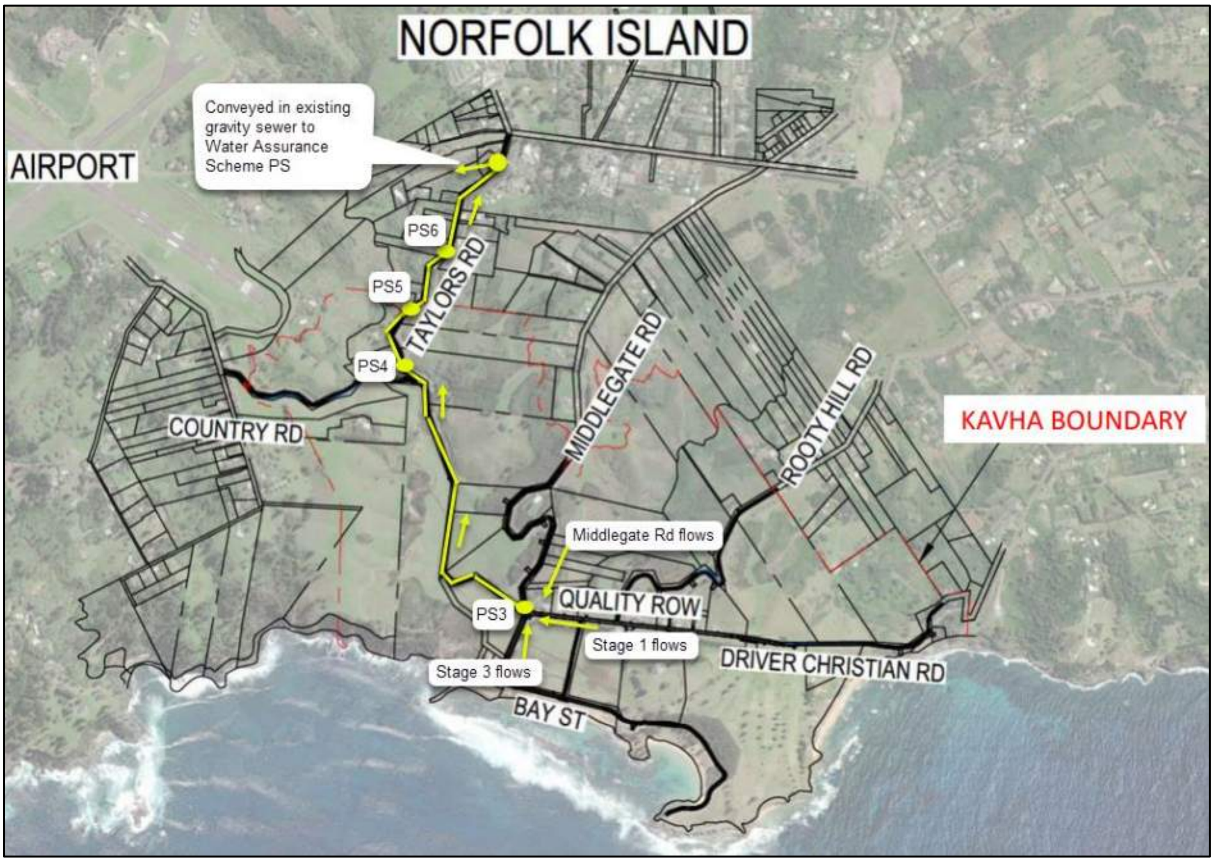

Figure 6.1: KAVHA Wastewater Scheme

6.2 Wastewater Scheme Design

6.2.1 General

A detailed design report ref. RP 23-08-17 ESG 000770 dated August 2023 has been produced to give a full description of the design of Stage 2 of the scheme. A copy can be obtained upon request. The wastewater scheme components described in this report highlight significant items taken from the detailed design report.

6.2.2 Flows

The design standard AS/NZS 1547:2012 On-Site Domestic Wastewater Management has been used to calculate wastewater flows from the houses and facilities connecting to this scheme. An assessment of design wastewater flows using AS/NZS 3500.2:2018 was also undertaken and determined to be overly conservative and not representative of typical flows for this type of community. Table 6.1 below presents the calculation of the Average Dry Weather Flows (ADWF), Peak Dry Weather Flows (PDWF) and Peak Wet Weather Flows (PWWF) for all the wastewater from Stages 1, 2 and 3, arriving at the bottom pumping station - PS3.

Table 6.1: Design Wastewater Flows Arriving at PS3

Site	Equivalent Tenements	ADWF (m3/day)	ADWF (l/sec)	Diurnal Multiplier	PDWF (l/sec)	Wet Weather Factor	PWWF (l/sec)
Lone Pine	2	0.9	0.01	5.0	0.05	2.0	0.10
Emily Bay Public Toilets	5	2.25	0.03	5.0	0.13	2.0	0.26
Govt House	2	0.9	0.01	2.5	0.03	2.0	0.05
Cemetery	2	0.9	0.01	5.0	0.05	2.0	0.10
Golf Club	4	1.8	0.02	5.0	0.10	2.0	0.21
5 Quality Row	1	0.45	0.01	2.5	0.01	2.0	0.03
6 Quality Row	1	0.45	0.01	2.5	0.01	2.0	0.03
7 Quality Row	1	0.45	0.01	2.5	0.01	2.0	0.03
8 Quality Row	1	0.45	0.01	2.5	0.01	2.0	0.03
9 Quality Row	1	0.45	0.01	2.5	0.01	2.0	0.03
10 Quality Row	1	0.45	0.01	2.5	0.01	2.0	0.03
Govt House Public Toilets	2	0.9	0.01	5.0	0.05	2.0	0.10
11 Quality Row	2	0.9	0.01	5.0	0.05	2.0	0.10
Old Military Barracks	2	0.9	0.01	5.0	0.05	2.0	0.10
New Military Barracks	4	1.8	0.02	5.0	0.10	2.0	0.21
Church	2	0.9	0.01	5.0	0.05	2.0	0.10
Kingston Cottages	2	0.9	0.01	2.5	0.03	2.0	0.05
Slaughter public toilets	6	2.7	0.03	5.0	0.16	2.0	0.31
Compound public	1	0.45	0.01	5.0	0.03	2.0	0.05
Munna's	1	0.45	0.01	5.0	0.03	2.0	0.05
Kingston Pier toilets public	6	2.7	0.03	5.0	0.16	2.0	0.31
Lions Club	3	1.35	0.02	5.0	0.08	2.0	0.16
Panorama Motels	10	4.5	0.05	5.0	0.26	2.0	0.52
Island Bay Motels	6	2.7	0.03	5.0	0.16	2.0	0.31
High house Middlegate Road	1	0.45	0.01	2.5	0.01	2.0	0.03
Low house Middlegate Road	1	0.45	0.01	2.5	0.01	2.0	0.03
TOTALS	**70**	**31.5**	**0.36**		**1.67**		**3.33**

The three lines highlighted in yellow are potential future connections to the scheme.

Further to the flows noted above the wastewater scheme is also able to convey flows from the houses adjacent to Country Road and Taylors Road if they are fitted with their own small pressure sewer pumping stations. The 19 households adjacent to the Country Road / Taylors Road rising main will be able to connect to the new scheme. Should more houses be built along the pipeline route they should be able to connect to the scheme as this type of wastewater system is quite flexible and flows will not all arrive at the same time (diversity). It is suggested however that any new connections are requested formally and that the hydraulics are checked to ensure that the new small house pumping stations and pumps are sized appropriately and integrate into the scheme as expected.

6.2.3 Location and Layout

The layout of the proposed wastewater scheme and the construction methodology described below is based on the design drawings presented in this report. The pipeline alignments and location of the pumping stations have been determined to avoid existing services and take into consideration the surrounding topography and surface features and mitigate and minimise actual or potential; effects on built and natural heritage features and impacts on Acid Sulfate Soils.

Furthermore, the pipeline alignments and depths have taken the proposed road upgrades (currently being designed) into consideration by incorporating the digital design files from GHD who have designed the road upgrades.

6.2.4 Pumping Stations

6.2.4.1 Stage 2 Pumping Stations

The trunk pumping stations - PS3, PS4, PS5 and PS6 will be manufactured from fibreglass and be fitted with duty and standby Flygt submersible grinder pumps controlled with OmniSmart 6000 dual pump controllers. The pumping stations are fitted with McBerns activated carbon odour filters to mitigate any malodours escaping.

The pumps in the trunk pumping stations differ from the smaller Omni Grind Turbine pumps in the smaller pressure sewer pumping stations being installed in Stages 1 and 3 because the smaller pumps cannot meet the required flows and pressure that the larger trunk sewer pumps can deliver. However, the control system being used for the four trunk sewer pumping stations is the same brand (OmniSmart) to provide the operator the ability to easily maintain the entire system.

The trunk pumping stations have been sized to hold total emergency storage volumes of 24 hours of ADWFs plus one pumping cycle from the upstream pumping station. This is typical for pumping systems with limited availability for immediate operator response should something go wrong. The operators are also able to drain the downstream rising mains to each of the pumping stations if required as the emergency storage volumes are larger than the downstream rising main volumes.

The emergency storage provisions differ slightly from the smaller pressure sewer pumping stations (48 hours) due to the large variation in flows arriving at the trunk pumping stations (diversity) and the need to address faults in these larger pumping stations first as they are taking flows from multiple dwellings. For example, PS3 is taking wastewater from 68 equivalent tenements (Table 6.1).

Table 6.2 presents the proposed pumping station wet well diameters and depths.

Table 6.2: Wet Well Dimensions

Pump Station	Wet Well Internal Diameter (m)	Wet Well Depth (m)
PS3*	2.0	3.5
PS4	1.5	2.5
PS5	1.5	2.5
PS6	2.0	2.5

*Pumping Station PS3 wet well diameter and depth has been calculated based on an additional adjacent horizontal fibreglass emergency storage chamber (2m dia. x 8m long) with 1m cover below the ground to provide a total storage volume of at least $31m^3$ plus the addition of minimum pump operating depth (200mm), pumping range operating depth (90mm) and the 50mm buffer.

The emergency storage at PS3 has been sized to hold 24 hours of ADWFs from all the properties in the KAVHA area as noted in Table 6.1. i.e. 0.36L/sec x 3600sec/hr x 24hrs = $31.1m^3$.

Excavations for the pumping stations will require approximately 0.5m clearance around the units being installed. For example, the excavations for the PS3 wet well will be approximately 3m x 3m x 4m deep ($36m^3$). Excavation for the emergency storage located next to the pumping station will be approximately 3m x 9m x 3.5m deep ($95m^3$). This is the only trunk pumping station that has additional emergency storage beyond what the wet well can provide. PS4 and PS5 will require approximately $19m^3$ of excavation and PS6 - $27m^3$ of excavation.

The proposed locations of the Stage 2 pumping stations shown in Figure 6.1 have been selected based on the hydraulics of the proposed system, the proximity to an adjacent power supply and the available space in the road reserve sited off the road to allow easy access for maintenance.

Figures 6.2. to 6.5 show the proposed Stage 2 pumping station locations.

Figure 6.2: PS3 Location

Figure 6.3: PS4 Location

Figure 6.4: PS5 Location

Figure 6.5: PS6 Location

6.2.4.2 Stage 3 Pumping Stations

The pressure sewer pumping stations to be installed as part of the Stage 3 works are the same as those used in Stage 1. The pumps are controlled with Aquatec OmniSmart controllers.

Wastewater from the public toilets in the Royal Engineers Office (REO) and the Slaughter Bay public toilets will be collected and pumped by submersible Omni Grind Turbine macerating pumps fitted inside Aquatec Simplex OGT 1500L polyethylene pumping stations supplied with an additional 1100L (1m dia. x 1.6m deep) polyethylene storage tank feeding wastewater into the pressure sewer system and ultimately to PS3. Each of these two pumping stations will require a total excavation of approximately 19m^3.

All the other pumping stations in the Stage 3 area will be Aquatec Enduraplex OGT 950L polyethylene pumping stations fitted with submersible Omni Grind Turbine pumps that will feed macerated wastewater into the pressure sewer system and ultimately to PS3. Each of these pumping stations will each require a total excavation of approximately 9m^3.

The location and plans and cross sections of the Stage 3 pumping stations are shown on the drawings presented in the Appendices.

6.2.5 Other Wastewater Scheme Components

The pressure sewer reticulation is also to be fitted with the following items - as shown on the drawings:

i. Flushing Points

These are located at positions shown on the drawings and constructed to the details shown on the Aquatec drawings. They are used to periodically flush the pipelines (say once a year) to ensure that the scheme continues to work efficiently. Flushing of the pipes is done by connecting a water truck to the camlock coupling and pumping water through the system.

ii. Isolation Valves

Isolation valves are located as shown on the drawings and constructed to the details shown on the Aquatec drawings. They will provide the operator flexibility in maintaining the scheme such that some of the scheme can continue to run while other areas are being maintained.

iii. Air Valves

Combination air and vacuum release valves are located at various sites around the scheme to allow any accumulated air to escape and/or vacuums to be relieved to enhance the hydraulic performance of the scheme. All air valves are fitted with McBerns activated carbon odour filters to mitigate any malodours escaping.

iv. Spare Pumps

Spare pumps will be provided for both the Aquatec pumping stations and the trunk pumping stations to sit in the operator's yard in case one of them fails and needs replacement. The trunk pumping stations are also fitted with duty and standby pumps in case of failure. Furthermore, the pumps in PS4, PS5 and PS6[1] are all the same such that a standby pump from one of the pumping stations could be transferred to another station in an emergency.

v. Tracer Wire

Coloured tracer wire tape will be laid above the PE pipes and any cables in the trenches to allow the rapid location of the underground pipes and cables to ensure that they are not damaged by any adjacent future works.

[1] The PS3 pumps are larger than the PS4, PS5 and PS6 pumps and are therefore not interchangeable.

6.3 Detailed Design Drawings

Detailed design drawing for Stages 2 and 3 of the wastewater scheme are presented in the Appendices of this report.

6.4 Pumping Station Operations

6.4.1 Stage 2 Trunk Sewer Pumping Stations

The high-level functional description for the Stage 2 trunk pumping stations is as follows:

i. The wastewater pumps in each pumping station have been sized to operate in duty/standby configuration. In other words each pump can pump the required flows by itself. When one pump fails the second pump starts automatically to take over the “duty”.

ii. The pumps are able to be controlled both automatically or manually (during maintenance). Switches are located on the boards - see a typical switchboard in Figure 6.7 below. In manual mode, the low level stop is ignored so that the pump well can be pumped out.

iii. Pump currents for each phase are shown on OmniSmart LCD screens along with pump operational data (starts & run hours) fault notification and the wet well level. The LCD display screens will be located behind the switchboard enclosure doors.

iv. The pumps in each pumping station are triggered to start and stop using an Aquatec 4-20mAmp hydrostatic level transducer.

v. The pumping stations will also be fitted with an Aquatec high-level switch to send an alarm to the operators via the SMS system and a digital signal via the 5 core 1.5mm^2 steel wire armoured cable being laid the rising main trench between the pumping stations to stop the upstream pumping station from pumping should the pumps not operate effectively for any reason.

vi. As noted earlier, the 4 pumping stations will pump wastewater up to an existing gravity sewer manhole at the top of Taylors Road that is part of the Norfolk Island Water Assurance wastewater network. From here the wastewater will flow (via the existing gravity wastewater pipeline) to an existing pumping station (known as the Mildred Pumping Station) in the Water Assurance wastewater network. This pumping station will pump wastewater from KAVHA, along with a significant portion of the Burnt Pine community’s wastewater, to the town’s wastewater treatment plant. Should the Mildred Pumping Station experience an alarm that shuts the pumping station down, or has a high-level alarm, it will send an SMS signal to PS6 to trigger it to shut down. An additional SMS Autodialler with a switched output will be installed into the PS6 controller to be able to receive the signal from Mildred Pumping Station. Once the wastewater in PS6 reaches its high level alarm setting it will send a hard wired signal to PS5 to stop pumping. PS5 will trigger PS4 to stop when it reaches its high-level alarm and so on down the line to PS3 (via the 5 core cable).

vii. All alarms including any pump fault alarms are to send an SMS to the operator (and others if required).

viii. As noted earlier the wastewater levels in the pumping station wet wells are displayed in their respective switchboards through the OmniSmart 6000 controllers. Should the operator require to see the wastewater level in another pumping station for maintenance reasons (e.g. so they don't manually pump into a downstream pumping station that is already full) the operator can send the downstream pump station an SMS to get the real time level. This can be repeated as often as required and eliminates the need for an analogue signal to be sent between the sites via the cable.

ix. The two flow meters will record both instantaneous and totalised flows and be displayed in the PS3 and PS6 switchboards respectively. At this stage the flows / totals are not being sent anywhere else.

6.4.2 Stage 3 Pressure Sewer Pumping Stations

Each of the seven Stage 3 pumping stations will operate independently from one another, the same as the Stage 1 pumping stations. The locations of the pumping stations are shown on the drawings in the Appendices. All the Stage 3 flows enter the Stage 1 scheme prior to arriving at PS3. These flows have been allowed for in the Stage 1 and Stage 2 scheme designs. The pumping stations will not be communicating with each other. This is how most pressure sewer systems work and removes unnecessary complexity.

Each pumping station will be supplied with OmniSmart 1000 controllers that will be located in a control box fitted to the house or structure. Information pertaining to the controllers is presented in the Appendices.

The pumping stations are fitted with a pump start, pump stop and emergency high level float switches. As shown on the drawings in the Appendices a pumping station pump will operate when the wastewater level in the chamber triggers the pump to start. The pump will be triggered to stop when the wastewater level has subsequently dropped to a set point to prevent the pumps from running dry.

A pressure sewer system works on the ability for a pump to pump into a common rising main. If other pumps are pumping in at the same time, the pressure in the rising main may be too high for the next pump to be able to feed in. In this instance the pump will stop and will try again after a period of time (up to 30 minutes later). Each pumping station is fitted with a randomised timer which allows this operation to be performed up to 10 times before an alarm is generated. As the time to pump down the operating storage in each pumping station is in the order of 1 minute, the potential for this scenario to occur is limited. For a standard house, a pumping station pump will operate approximately 4 x per day.

In the unlikely event that the pump does not start, the emergency high-level float switch will also trigger an alarm.

In addition, unacceptable pump motor currents as well as over temperature in the motor picked up by thermistors in the motor windings will also trigger alarms.

Any alarms generated will be picked up by the OmniSmart Controllers and trigger a red flashing light on top of the board and send out an SMS message to the scheme operator. In the unlikely event of a pumping station failure, the operator will be able to suck out wastewater from the pumping station into a septic tank vacuum truck and take it to the island's wastewater treatment plant, as is currently the case with all sewage holding tanks in KAVHA.

6.4.3 Future Pressure Sewer Pumping Stations

As noted earlier in this report, the trunk sewer rising main and pumps in Stage 2 have the ability to convey wastewater flows from houses adjacent to the rising main in Country Road Taylors Road, and Middlegate Road, although these connections are outside the scope of the Proposal. When the adjacent properties connect they will also be fitted with Aquatec Enduraplex OGT 950L polyethylene pumping stations fitted with submersible Omni Grind Turbine pumps and OmniSmart 1000 controllers and will operate the same as the Stage 1 and Stage 3 pumping stations as described in Section 6.4.2 above. The operator of the scheme will have a formal process for the connection of additional houses and will require that the supply and installation of the additional pumping stations and associated rising mains will need to meet specific criteria and specifications and be installed by approved contractors.

6.5 Power

6.5.1 Stage 2 Pumping Stations

The Stage 2 trunk pumping stations will be supplied with three phase power from the adjacent overhead HV powerlines on Country Road and Taylors Road.

It is proposed to install a pole mounted transformer for PS3 on the existing power pole nearby and run an LV supply in a 900mm deep trench to a switchboard located behind the historic water well as shown on the drawings. Power to PS4, PS5 and PS6 is currently proposed to be supplied from a new pole mounted transformer (to replace the existing one) located south of PS5 off the McDonalds boundary. LV cables would then come off the transformer and run to the respective pumping station switchboards located in the 450mm wide trunk rising main trench (150mm away from the rising main) as shown on the drawings in the Appendices.

6.5.2 Stage 3 Pumping Stations

Single phase power is necessary for the Stage 3 pumping stations and will be provided for by connecting to the associated building power supply switchboard.

The cables will run from the building to the Stage 3 pumping stations in 300mm wide x 1m deep trenches.

The pumping station control panels will be located in small weatherproof enclosures located on the wall of the building opposite each pumping station.

6.6 Pipelines

6.6.1 Pipe Size Pressure Class and Material Selection

Polyethylene rising mains to AS/NZS 4130:2018 - PE pipes were selected as the preferred pipe materials for the rising mains for the following reasons:

- The flows being pumped were quite small thereby requiring smaller diameter pipes.
- The need to keep the weight and volume of materials down to minimise transport costs.
- Taking into consideration the training and resources of the contractors located on Norfolk Island.
- The need to install the pipelines quickly to minimise disruption to traffic along the road.
- Flexibility of the internal diameters available to maintain flushing velocities and acceptable friction losses to help in the selection of standard wastewater pumps.
- The need to provide suitably pressure rated pipes to withstand surge pressures in case of sudden pump failure.
- To meet WSA 04-2022 standards requiring PN16 pipe.

6.6.2 Trench Details for Buried Pipes

AS/NZS 2566.2:2002 - Buried Flexible Pipes states that the absolute minimum cover for buried pipes is 600mm (for sealed carriageways) and 450mm (for areas subject to vehicular loading outside of the carriageway). This design has allowed for 750mm cover within the carriageway, and 600mm in areas outside of the road carriageway to comply with standard practice to prevent damage to the pipelines. Where the pipe cover is less than 750mm, a 100mm thick fibre-reinforced concrete capping is proposed as shown on the drawings in the Appendices.

The extent and type of bedding materials was determined following discussions with contractors as to what is readily available on Norfolk Island. Furthermore, given the pipe material selected allows the backfilling of the trenches to be made using material excavated from the trenches. Any reinstatement of the trenches will be made to match existing including the supply and compaction of road basecourse metals.

6.6.3 Pipe Alignments

Drawings presented in the Appendices show the location of the proposed pipeline routes and the depth of the pipes in the long sections.

The alignment and depths of the pipes have been determined based on keeping the pipes located in the road pavements for three reasons:

- The ground is already disturbed in those areas thereby reducing the risk of coming across any historical (archaeological) items.

- In some areas there is minimal depth to underlying limestone deposits from old reefs. When building the roads any residual bedrock would most likely have been exposed and removed to allow the construction of the road pavements.
- Placing the pipes in the roads reduces the potential of entering adjacent land owned by others.

The location and depths of the pipes have also taken the future road upgrades into consideration to make sure the pipes are still located in the future road pavements and that the depth of the pipelines has considered any existing areas that will be cut down during the upgrades. Digital files supplied by GHD for the road upgrade designs were used to locate the pipes in the best position both now and in the future. The extent of the seal for the future roads is shown on the drawings in the Appendices as dotted lines.

6.7 Visual Impacts

The visual impact of the scheme will be minimal as most of the components are below ground. Examples of components situated above ground are the small Aquatec pumping Station control panels as shown in Figure 6.6, the switchboard cabinets for the Stage 2 trunk pumping stations similar to the cabinet shown in Figure 6.7 and the pumping station lids for all the pumping stations similar to those shown in Figure 6.8.

The small pumping station control panels will be located on the associated building walls close to the wet wells. The size of these panels are shown in Figure 6.6 below.

The locations of the larger trunk pumping station switchboards are presented in the Stage 2 drawings. The size of these larger switchboards are 1800mm high x 800mm wide x 450mm thick. Part of the 1800mm height is a 500mm allowance for the local power supplier's meter currently sitting on top of the rest of the switchboard. Discussions are being held with the supply authority to see whether this component can be shifted to beside the switchboard or where the power supply comes off the transformers to try and minimise the overall height of the four trunk pumping station switchboards.

Figure 6.6: OmniSmart Pump Controller

Figure 6.7: Typical Wastewater PS Control Cabinet


Figure 6.8: Pumping Station Lid

6.8 Procurement and Delivery

Components will be sourced from both Australia and New Zealand. Pump stations and pipes will be purchased in Australia and freighted to Norfolk Island by ship.

7.0 Construction Methodology

It is proposed to complete the supply and installation of Stage 2 of the scheme before completing the commissioning and connection of Stage 1. Once wastewater is successfully flowing in Stages 1 and 2, works will begin on the installation of the Stage 3 works.

Construction of pump stations will involve the excavation volumes described in Sections 6.2.4.1 and 6.2.4.2 above.

The alignment of the wastewater pipelines will closely follow the routes presented in the drawings for the reasons given in Section 6.6.

Given the proximity to the built heritage sites there is the potential for the accidental discovery of items of archeological interest in the vicinity. The proposed pipeline alignments have been agreed on the ground with the resident Norfolk Island Heritage Manager in order to minimise any potential impact on heritage sites and the Norfolk Pine trees. If any items of archeological interest are uncovered during construction, the works will be halted in that area while the Norfolk Island Heritage Manager is consulted, and appropriate actions undertaken as agreed with the Heritage Manager. This may include screening of the excavated material.

Any open excavation areas will be kept to a minimum to avoid potential siltation and safety concerns. Backfilling will be compacted by foot and/or plate compactors. Grass will grow back naturally to match the existing adjacent ground.

Any unsuitable excavated material unable to be used for trench backfilling due to a high number of rocks that can potentially damage the pipelines or conversely due to having too many organics that could enhance trench settlement will be transported to the Watermill Dam site. The Watermill Dam site is an established stockpile area of sandstone, rock utilised for construction and earthworks across Norfolk Island.

7.1 Equipment and Machinery

A range of small excavators (1.6 - 5 tonne) will be used for excavation of trenches and pump station sites. A Ditchwitch trenching machine will also be used should soil conditions allow. Small trucks will be used to transport the pipes and pumping stations to each site.

7.2 Work Hours

As most of the Stage 2 and 3 works are located in the roads, the contractor will try and complete the works as soon as possible to minimise any disruption to the public. For this reason, it is proposed to have the ability to work **between 7.00am to 6.00pm, 7 days per week.** This also allows for any downtime due to wet weather. It is expected that the Stage 2 works will take between 4 - 6 months and the Stage 3 works an additional 3 - 4 months.

The contractor shall ensure that no heavy vehicles will enter or exit the site and no machinery shall start up or operate earlier than 7.30am and that all works on the site will cease by 6.00pm.

7.3 Stockpile Areas

Pump stations and the new holding tanks will be stored at the contractor's business premises and transported to site individually as required.

7.3.1 Stage 2

For the Stage 2 works a temporary storage container, some hardware, machinery and hand tools will be stored at the designated stockpile location, adjacent to the Watermill Creek Dam as shown on Figure 7.1 below. This stockpile area will utilise the existing access off Country Road.

7.3.2 Stage 3

For the Stage 3 works a temporary storage container, some hardware, machinery and hand tools will continue to be stored at the Stage 1 designated stockpile location, on the Pound Paddock between the Old and New Military Barracks as presented in Figure 7.2 below. This stockpile area will continue to utilise the existing access off Rooty Hill Road.

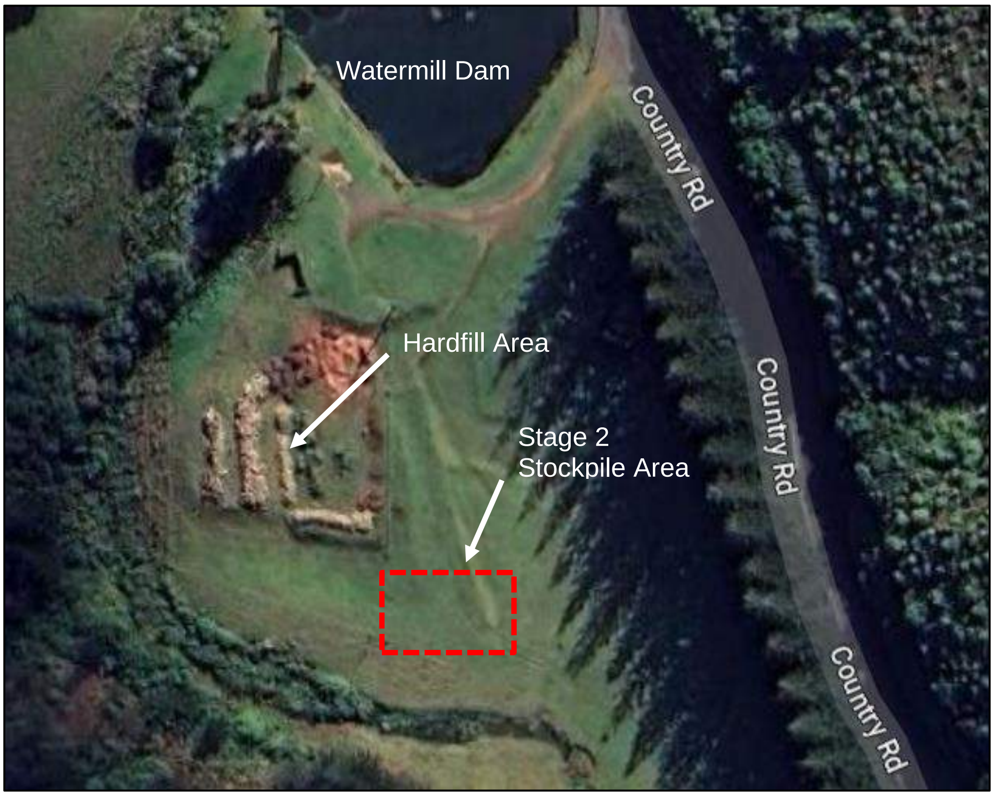

Figure 7.1: Location of Stage 2 Stockpile Area and KAVHA Hardfill Area

Figure 7.2: Location of Stage 3 Stockpile Area

7.4 Accesses

Access to and from the site, the stockpile areas as shown in Figures 7.1 and 7.2 will be via established roads and tracks.

The stockpile areas shown in Figures 7.1 and 7.2 will be used for temporarily storing of components such as pipework and pumps. The stockpile areas will not be used for stockpiling soils as the extent of earthworks has been minimised for potential erosion mitigation and any soils will be mounded adjacent to the associated excavation as described later in the report.

The construction of any further temporary access tracks are not necessary as all sites including the stockpile area are accessible via existing roads and tracks.

A Traffic Management Plan will be completed by the contractor prior to the start of works to ensure that public safety is maintained throughout the construction.

7.5 Earthworks

The area of exposed earthworks is to be kept to a practical minimum at all times. Once an area of work has been completed it will have the excavated soil replaced and compacted and topsoil respread and shaped over the top to match the existing adjacent ground. This will be completed prior to progressing to any new areas. This methodology will help mitigate any potential erosion due to wind or water.

No mounds of earth are to exceed a height of 1.5m, are not to exceed up to 30m linear metres, and will be located 1-2m uphill / upgradient of the area being excavated to help mitigate any surface runoff entering the trenches from above. The maximum length of open trenches will be limited to no more than 30 linear metres before being backfilled[2]. Open trenching and backfill mounds for works in lower lying areas of Stage 3 are likely to be shorter due to the extent of trenching required and the potential for slower progress due to working immediately adjacent to historical buildings and infrastructure and close to the beachfront.

If backfill material is considered unsuitable, more suitable material will be sourced from the current Watermill Dam hardfill area.

Trench excavations for the installation of the pipelines will be approximately 1m deep x 0.45m wide. Typical trench cross sections are shown on the drawings presented in the Appendices and exceed the requirements of the Sewerage Code of Australia. Two to three workers will work together excavating, bedding, laying and testing pipelines and pumping stations and backfilling and compacting excavations for these relatively short 30 linear metre long sections. Any open excavations will be backfilled within the same working day with the exception of small (say 2.5m^2) fenced off areas where work will continue the next day. This will ease the start of works each day. Details of this are described further in Section 9.3 below.

Given the scale of the works and the short distances of shallow open excavations, a detailed cut and fill plan is not considered necessary.

Where there is the potential for stormwater runoff from uphill areas impacting the works, sandbags will be placed upgradient of the back fill piles, and where appropriate will surround the excavated areas to divert any runoff and prevent it becoming contaminated with excavated soils and/or bedding and backfill materials. These sandbags will be moved as the construction work moves, following reinstatement of the excavated areas. Figures showing the proposed extent of sediment control measures are presented in the Appendices.

7.5.1 Stage 2

Works for stage are within the road corridors within the road pavement gravels. Trenching details are as presented on the Stage 2 drawings in the Appendices. Works will be reinstated as per the existing road surfacing.

7.5.2 Stage 3

Works along Pier Street, Bounty Street and Bay Street will be within the road alignment and within the road pavement gravels with the exception of where a rising main needs to pass behind the cattle grid in Pier Street. Trenching details are as presented on the Stage 3 drawings in the Appendices. Works will be reinstated as per the existing road surfacing where the pipes are in roads. Where the pipes are located in grassed areas (minimal extent in Stages 2 and 3) the ground will be left to allow the grass to regenerate naturally to match the existing adjacent grass.

[2] Trenching is limited to no more than 30 linear metres of open trenching at any one time. This does not limit trenching to 30 linear metres per day or require consecutive 30 linear metre lengths. The limitation is no more than 30 linear metres open at any one time.

Care will be taken in the vicinity of the culvert crossings, that backfill will not be placed such that runoff into Watermill Creek can take place. Erosion and sediment control measures are presented in Section 9 below.

7.6 Reinstatement

Excavated material will be used as backfill where it is deemed as being suitable. Suitable clean backfill will also be sourced from the current supply at the Watermill Dam hardfill area as required. A foot compactor and/or plate compactor will be used to compact the backfill.

The supply of bedding material for the pipelines is limited on Norfolk Island. As a result, bedding material will be crusher dust and/or sourced by straining the excavated material from below the topsoil layer to remove larger rocks and stones if it is deemed suitable. The strained material will then be placed and compacted back into the trench to act as bedding for the pipelines.

Any excess or unsuitable material will be transported to the existing hardfill area near Watermill Dam.

Reinstated areas will be irrigated as necessary to promote grass regrowth and to prevent dust erosion.

8.0 Construction Environmental Risk Management

Environmental risk assessment is the identification and characterisation of existing and potential adverse effects to humans and the environment resulting from environmental hazards.

Tables 8.1 and 8.2 below present the risk assessment criteria, and risk reduction and management which have been applied to this construction plan. The criteria used is based on ISO 31000:2009.

Table 8.1: Risk Assessment Criteria

<table>
<tr><td colspan="3" rowspan="3"></td><td colspan="5">Consequence</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Insignificant
Very minor impact.</td><td>Minor
Minor impact with moderate costs.</td><td>Moderate
Medium impact requiring ongoing management.</td><td>Major
Major issue/high financial loss.</td><td>Catastrophic
Major issue, very high long-term costs.</td></tr>
<tr><td rowspan="5">Likelihood</td><td>5</td><td>Almost certain
Is expected to occur in most circumstances.</td><td>Moderate</td><td>High</td><td>High</td><td>Extreme</td><td>Extreme</td></tr>
<tr><td>4</td><td>Likely
Will probably occur in most circumstances.</td><td>Moderate</td><td>Moderate</td><td>High</td><td>High</td><td>Extreme</td></tr>
<tr><td>3</td><td>Possible
Might occur at some time.</td><td>Low</td><td>Moderate</td><td>Moderate</td><td>High</td><td>High</td></tr>
<tr><td>2</td><td>Unlikely
Could occur at some time.</td><td>Low</td><td>Low</td><td>Moderate</td><td>Moderate</td><td>High</td></tr>
<tr><td>1</td><td>Rare
May occur in very exceptional circumstances.</td><td>Low</td><td>Low</td><td>Low</td><td>Moderate</td><td>High</td></tr>
</table>

Table 8.2: Risk Reduction and Management

Level of Risk	Risk Management Philosophy
Extreme	Unacceptable risk that will not be tolerated and must be engineered down to a lower risk level.
High	High risks require that the engineering design or methodology should be altered to remove the hazards event (if possible) or to reduce the associated frequency or consequence severity so as to place the risk in a lower risk level.
Moderate	Moderate risks require active management to prevent or reduce its occurrence and to monitor changes that could place the risk in a higher level.
Low	Low risks require no further treatment other than monitoring as the project progresses to ensure that there is no potential for the risk level to increase with time. These risks can be managed by routine procedures.

The site-specific risk assessment for this construction project is presented in Table 8.3; it presents actual and potential environmental risks identified, and proposed controls to be implemented to avoid, minimise, or mitigate these risks to acceptable levels. Section 9 below discusses mitigation measures in more detail.

Table 8.3: Overview of Construction Environment Risks

Risk	Site Specific Issues and Potential Impacts	Initial Risk Level	Proposed Management Actions	Residual Risk (with management)
Acid sulphate soils. **Stage 2**	Construction activities generally can expose actual or potential acid sulphate soils by exposing the soils to oxygen resulting in a drop in acidity and release of acid and other contaminants to the environment. Dewatering activities can also result in exposure of acid sulphate soils and environmental impacts. Stage 2 works generally considered away from potential ASS locations apart from proximity to Watermill Creek, possibly lower end of Country Road.	Moderate	▪ Excavation is not proposed in areas where Acid Sulphate Soils are known to be present. Efforts to avoid or minimise disturbance of ASS soils have been made in the design of the alignment. ▪ Excavation is generally taking place where soil has previously been disturbed for the installation of other underground services, and for road construction or other activities. The previous road pavement materials and trench backfilling material will not include acid sulphate soils. ▪ Desktop assessment of CSIRO guidelines: - Australia's National Science Agency - Norfolk Island Water Resource Assessment Summary Report 2020, concludes Acid Sulphate Soils are unlikely to be present in the vicinity of the construction route. ▪ It is advised that in the unlikely event that soils are observed as potentially being Acid Sulphate Soils, then work will be stopped and an appropriately qualified and experienced soil scientist will be contacted to advise of actions. ▪ Excavation work is restricted to shallow, relatively short spans of open trenching (no more than 30 metres of trench open at any one time). Consequently, exposure of soils to oxygen will be kept to a minimum in case Acid Sulphate Soils are present, although this is considered unlikely. ▪ Any dewatering will be avoided as much as possible. ▪ Acid Sulphate Soil Management Plan prepared by an appropriately qualified and experienced soil scientist in accordance with guidance set out in the Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines v4.0 (or similar) - refer Section 9.5.2 below.	Low
Acid sulphate soils. **Stage 3**	There are known to be ASS in the vicinity of Watermill Creek, and high potential to be ASS in the wetland areas in the lower lying locations of Stage 3 works. Construction activities in Stage 3 can expose actual or potential acid sulphate soils by exposing the soils to oxygen resulting in a drop in acidity and release of acid and other contaminants to the environment.	High	▪ Excavation is generally taking place where soil has previously been disturbed for the installation of other underground services, and for road construction or other activities. The previous road pavement materials and trench backfilling material will not include acid sulphate soils. ▪ Efforts to avoid or minimise disturbance of ASS soils have been made in the design of the alignment, following road alignment where possible, and avoiding wetland vegetation areas.	Moderate

Risk	Site Specific Issues and Potential Impacts	Initial Risk Level	Proposed Management Actions	Residual Risk (with management)
	Dewatering activities can also result in exposure of acid sulphate soils and environmental impacts.		▪ There are high risk locations around the two Watermill Creek stone culverts on Bounty Street and Pier Street however, which cannot be avoided. Excavation will be shallow, directly under the road carriageway in these locations through the lowest lying sections of Pier Street and Bounty Street. A qualified CSRIO Soil Scientist or their agent will be present on site and will direct methodology at these high risk locations if necessary. ▪ Excavation work is restricted to shallow, relatively short spans of open trenching (no more than 30 metres of trench open at any one time) due to the proximity of the historic culvert, Exposure of soils to oxygen will be kept to a minimum. ▪ Acid Sulphate Soil Management Plan prepared by an appropriately qualified and experienced soil scientist in accordance with guidance set out in the Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines v4.0 (or similar) - refer Section 9.5.2 below.	
Erosion and sediment discharge.	Excavation can result in the discharge of sediment into watercourses. Construction works can cause direct or indirect erosion through vegetation clearance, earthworks and other soil disturbance. Stormwater discharges and works in or near streams can lead to erosion and sedimentation. Stage 2 works are along road alignments Country Road, Taylors Road and Middlegate Road. Potential impacts on drains running into Watermill Creek. Stage 3 works are in the proximity of Watermill Creek and associated wetland areas, Emily Bay and Slaughter Bay.	Moderate	▪ Sediment and erosion controls shall be installed around any works where there is potential for sediment movement or runoff and must be installed prior to land disturbance. ▪ Storage areas are to be located away from drains, away from Watermill Creek and areas of wetland / native vegetation towards Emily Bay. ▪ Vehicle and machinery movement is to be limited to the existing access tracks and roads to ensure indirect erosion or movement of sediment is minimised. ▪ Implementation of the ESCP / SMP erosion and sediment control measures are further discussed in Section 9, and in ESCP Drawings in the Appendices. ▪ Silt fencing will be erected on both sides of Pier Street and Bounty Street, and down gradient of works across the Golf Course. ▪ Sandbags will be placed around drains, culverts, and cattle grids to minimise sediment entering drainage channels. ▪ Sandbags will be placed up gradient of silt fencing in the lower lying mid-sections of Pier Street and Bounty Street around the culvert locations. ▪ Open excavation trench lengths will be kept to a minimum, and upon completion, excavated areas shall be reinstated.	Low

Risk	Site Specific Issues and Potential Impacts	Initial Risk Level	Proposed Management Actions	Residual Risk (with management)
Loss of native flora and fauna species or habitats. **Stage 2**	Flora and fauna impacts can include disturbance and / or death of fauna; removal of vegetation and habitat; damage to structural roots leading to instability of trees; damage to overhead branches; compaction of soil around roots from parking / stockpiling. Works are within the road corridor close proximity to Norfolk Pines and other vegetation is avoided.	Moderate	▪ Vegetation clearance is to be limited to the designated construction footprint. Access to the works is to be via existing roads and access tracks only. ▪ Staging and storage areas are to be limited to the designated construction footprint. ▪ The proposed route for trenchwork along Country Road avoids working underneath the dripline of Norfolk Island Pine trees.	Low
Loss of native flora and fauna species or habitats. **Stage 3**	Stage 3 works include excavation across grassed areas downgradient of Watermill Creek, across the Golf Course, through pine tree areas around Lone Pine and Cemetery Bay toilet buildings, and along road verge areas.	Moderate	▪ Vegetation clearance is to be limited to the designated construction footprint. ▪ Wetland vegetation is avoided, with open grassed areas the chosen alignment. Grass will quickly grow back in trench areas in open fields and grassed verges.. ▪ Excavation in pine tree areas around Lone Pine and Cemetery Bay toilet buildings is particularly shallow at approximately 750mm deep and roots are not expected to be impacted.	Low
Discharge of hazardous substances.	Hazardous substances such as fuel and engine oil for machinery, sometimes used in construction projects can pose a risk to workers, the public and can cause pollution of soil, groundwater and / or waterways.	Moderate	▪ Hazardous substances are not to be stored on site unless in accordance with relevant legislation and requirements. All hazardous substances shall remain inaccessible to the public. ▪ The Contractor shall provide a list of all hazardous substances and chemicals to be used on site to the Project Manager. ▪ Plant and machinery shall be well-maintained and checked daily for leaks. ▪ Any fuel stored on the stockpile site shall be in a sealed and bunded fuel storage tank located >20m from surface water and in an area inaccessible to the public. ▪ Fire retardants and spill kits suitable for use with the chemicals on site shall be present and be replaced or restocked after use.	Low
Generation of solid or liquid waste.	The generation and storage of waste can result in contamination of soil, groundwater and / or waterways. The proposed works will require the generation of some excavated material waste, hardware component packaging waste and general waste from workers. Given the works are located close to Watermill Creek lower catchment, Emily Bay, Slaughter Bay there is potential for waste and waste products to end up in the bay if not properly contained. No contaminated waste is anticipated.	Moderate	▪ Waste should be minimised or else be reused, recycled or disposed of at a refuse facility (in that order of priority). ▪ Materials that cannot be recycled or reused must be disposed of off-site at a licensed facility e.g. refuse disposal facility. ▪ Burning of waste and stockpiling large volumes of waste is not permitted. ▪ Unused backfill material will be transported back to the current supply to the Watermill Dam hardfill area.	Low

Risk	Site Specific Issues and Potential Impacts	Initial Risk Level	Proposed Management Actions	Residual Risk (with management)
1:100 year ARI	There is potential for stormwater associated with larger storms to inundate excavation works, creating erosion and sediment run off towards Watermill Creek, Emily Bay or Slaughter Bay undermining built historic items in the vicinity.	High	▪ Standard weather forecasts will be followed closely by the contractor. ▪ Rather than assessing the severity of a wet weather event, a more conservative approach will be followed, being works will not be undertaken before, during or immediately after rain is forecast. ▪ For Stage 2 works, and higher lying areas of Stage 3 works (not in vicinity of Watermill Creek or lower lying section of Pier Street or Bounty Street), open excavations will be undertaken and backfilled in the same working day, areas of a maximum 2.5m^2 will be left excavated overnight. These open areas will be sandbagged and fenced off. If these excavations fill with water then they will be pumped out on to the ground. ▪ Low lying sections of Pier Street and Bounty Street, excavations will not be left open overnight, and will not be undertaken in wet weather. ▪ Any excavations in close proximity to existing septic tanks, where soils may be contaminated, will not be left open overnight and will not be undertaken in wet weather. ▪ The extent of any excavations is limited to a maximum of approximately 30 linear metres at a time before reinstatement. ▪ Sediment and erosion controls shall be installed around any works where there is potential for sediment movement or runoff and must be installed prior to land disturbance. ▪ The new wastewater scheme is designed such that effects of inundation, rainfall or power outages are mitigated against. This is achieved through submerged contained pump stations with additional capacity, and a high-quality communications system. ▪ The implementation of ESCP / SMP control measures presented in Section 9 will assist mitigation of effects. ▪ Erosion and sediment control installations will be monitored and maintained as stated in Section 9. ▪ Vehicle and machinery movement is to be limited to the existing access tracks and roads to ensure indirect erosion or movement of sediment is minimised. ▪ Upon completion, excavated areas shall be reinstated.	Moderate

Risk	Site Specific Issues and Potential Impacts	Initial Risk Level	Proposed Management Actions	Residual Risk (with management)
Cultural heritage items.	There is potential for cultural heritage items to be present in the construction area, particularly along Quality Row.	Moderate	▪ The Norfolk Island Heritage Manager will approve the detailed alignment of both Stages 2 and 3. ▪ The proposed route was chosen following site walkovers with Norfolk Island Heritage Manager and specific locations were avoided. ▪ The construction design enables shallow trenchwork only, considered to assist in mitigating against unnecessary effects on archaeological remains. ▪ Norfolk Island Heritage Manager will be on site for all Stage 3 works, and Stage 2 works of their choice, to undertake backfill sieving, using a 80cm x 80cm archaeological sieve. ▪ Any accidental discovery of cultural items or skeletal remains, the contractor will cease works immediately and consult the Norfolk Island Heritage Manager, if not already present.	Moderate
Risk to marine life.	There is potential to impact marine life from erosion and sediment runoff during construction of the works.	Moderate	▪ Implement erosion and sediment controls in accordance with an erosion and sediment control plan.	Low

The mitigation of these risks have been addressed in the following plans which form this document:

- Erosion and Sediment Control Plan
- Soil Management Plan
- Waste Management and Decommissioning Plan
- Operational Impacts and Mitigation

9.0 Erosion and Sediment Control and Soil Management Plan

9.1 Objectives

The primary objective of the ESCP and SMP is to prevent the erosion of soil from the site and its transportation downstream resulting in sedimentation of Watermill Creek or drainage channels and pollution of Emily Bay and Slaughter Bay. The Erosion and Sediment Control Plan for this project will achieve this objective through the implementation of the following strategies:

- Reducing water run off velocity.
- Controlling run off volume.
- Mitigating against run off into Watermill Creek or the Norfolk Marine Park.

The separation of and treatment of sediment-laden water, reducing runoff velocity, control of flow volume, control of flow path and the formation of a stable landform will demonstrate the success of these mitigation measures.

The scale of construction works is considered small, and the excavations undertaken will be shallow, with trenches excavated up to 30 linear metres at a time before being backfilled. No formal calculations relating to reinstatement or to cut and fill are considered necessary.

ESCP drawings in the Appendices present the site layout and erosion and sediment control measures proposed.

9.2 Site Management

Erosion and sediment control measures will put in place by the contractor prior to undertaking any excavations:

- Roads and access tracks will be kept clear of soil or sediment by the contractor using a bobcat and sweeper brush, any soil spills will be cleaned and returned to use as backfill for decommissioned septic tank sites. Road conditions will be checked regularly by the contractor to ensure they are kept clean.
- Silt fencing and sandbags where required will be placed adjacent to the work area to mitigate runoff entering and leaving the excavations.
- Backfill will be piled upgradient from trenchwork, with erosion control located upgradient from backfill.
- Stream and water crossings will be avoided. Where the pipelines cross Watermill Creek in Bounty Street and Pier Street they are located above the existing stone culverts and hence the trench will not enter the creek bed.
- Disposal of any water used from commissioning pump stations will be managed such that soils are not eroded or scoured. Water being used to commission the pump stations will be stored in a 1,000 litre transportable plastic tank on the back of a small truck.

9.3 Erosion and Sediment Control Measures

9.3.1 General

The key mitigation measure for erosion and sediment control is that areas being excavated will be backfilled within the same working day where appropriate. This is generally feasible because of the small scale of the sites, however in the event of archaeological finds then excavations will need to be left accessible. This scenario is discussed below. Backfilling where feasible enables avoidance of wet weather working and avoidance of leaving excavations open in wet weather. A small - maximum of 2.5m^2 - excavation will be left open overnight for the beginning of works the following day. This will be sandbagged, covered, and fenced off. A small sump pump would be used if necessary to remove any sitting water, this would be pumped onto the ground down gradient of the excavation.

Any excavations in close proximity to existing septic tanks, where soils may be contaminated, will not be left open overnight and will not be undertaken in wet weather.

Prior to construction works, the Norfolk Island Heritage Manager or contracted archaeologist will supervise the excavation of small 1 x 1m test pits. The purpose of this is to establish any items of archaeological interest. The Norfolk Island Heritage Manager has walked the proposed route with the designers.

Archaeological manual sieving will be undertaken concurrently with the excavation and backfilling being undertaken; sieving for small bones etc. This can be undertaken by the digger dumping shallow soils directly on to the sieve, materials will be collected, and sieved and returned to the backfill. This will enable open excavations to be kept to a minimum. The Norfolk Island Heritage Manager will advise which areas need to be sieved. The Norfolk Island Heritage Manager will advise if works need to halt. If a significant item, for example a skeleton, is found then the localised excavation will need to stay open for up to a week. Excavations needing to remain accessible will have sediment and erosion measures including sandbags put in place and will be covered over during that period.

All excavations will also be treated with erosion protection. For the scale and nature of the construction work, and the characteristics of the site and surrounds, sandbag erosion protection is considered appropriate as sandbags are the most easily sourced on the island.

Sandbag walls will be up to 0.5m in height and will be placed upgradient of works sites where there is the potential for runoff entering the site from uphill catchments. Sandbags will also be placed downstream of pumping station excavations where there is the potential for silt laden runoff to leave the site.

Silt fencing will also be utilised where there is the potential for silt laden runoff to enter adjacent sensitive areas. For example, it is proposed to install silt fencing adjacent to excavations in Pier Street and Bounty Street to prevent silts entering Watermill Creek.

This localised treatment is considered more suitable than a broader fan shaped sediment wall located further upgradient, which could in itself create increased localised stormwater flows, by catching and channeling larger volumes of stormwater run-off, than a small sand bagged area.

Wind erosion protection fencing may be erected if considered necessary for less sheltered stages of construction, however it is considered the existing vegetation and built stone walls, together with silt fences and sandbag walls will provide general shelter from wind erosion.

Site works will not start until the erosion and sediment control works are installed, checked and functional. The contractor will put these in place and check these.

Backfilling of soils and compaction by foot compactor and / or plate compactor will take place concurrently as the reticulation is being laid, unless there are archaeological finds, as previously described, when the localised excavation will remain accessible with erosion protection and a covering. This means that any backfill material will be stockpiled for minimal periods of time. Should this process be interrupted for longer periods, then cover sheets will be placed over backfill soil mounds to prevent erosion or movement of sediment.

Principles of erosion and sediment control for trench excavation will be followed. Examples of sediment control measures are presented in Figures 9.1 to 9.6 below. Some of these are extracted from *Managing Urban Stormwater Soils and Construction, Volume 2A, Installation of services.* Department of Stormwater and Climate Change NSW.

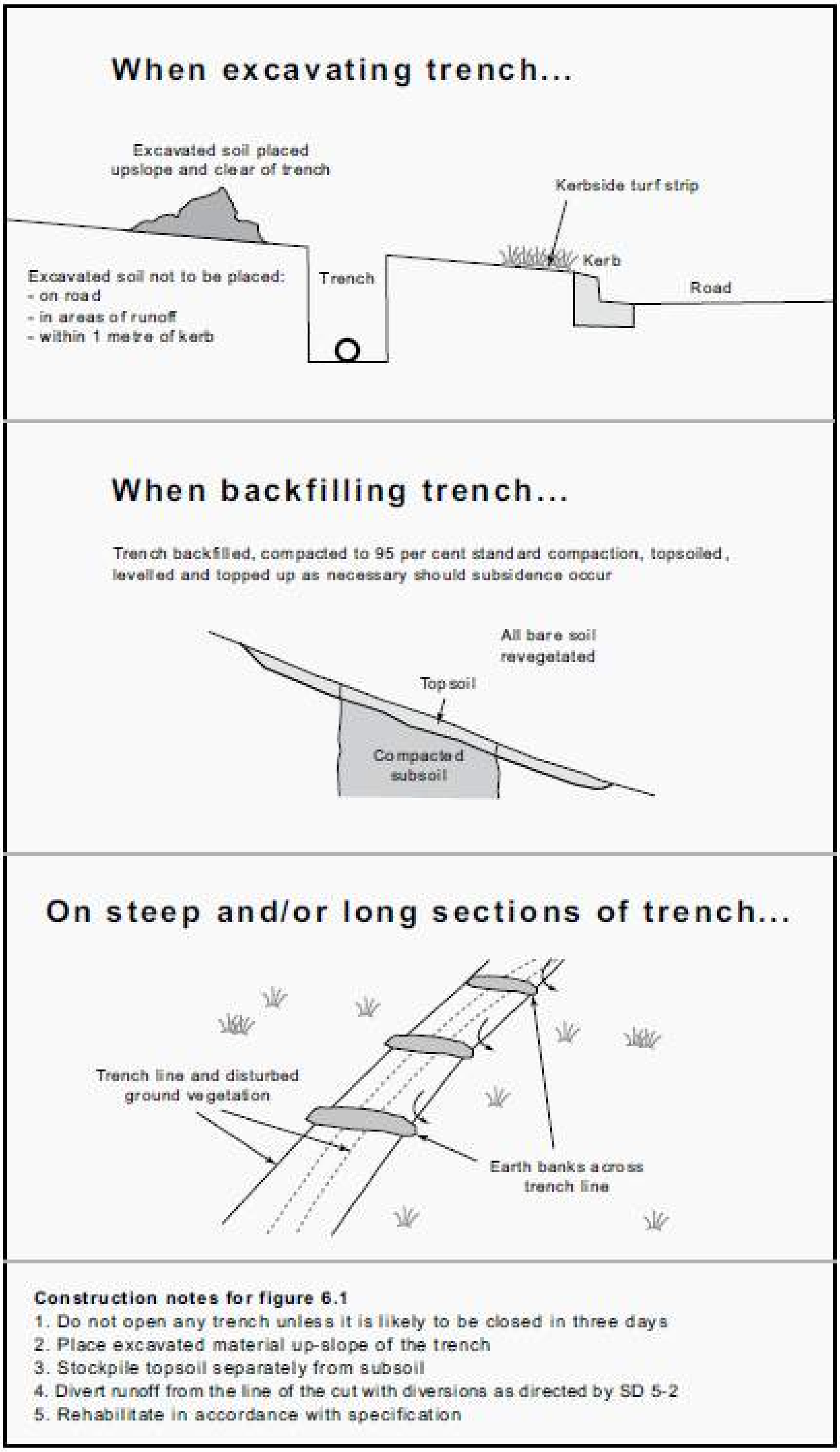

Figure 9.1: Erosion and Sediment Control during Trenching Activities

Figure 9.2: Examples of Silt Fencing and Sandbags

Figure 9.3: Example of Silt Fence in a Road Verge

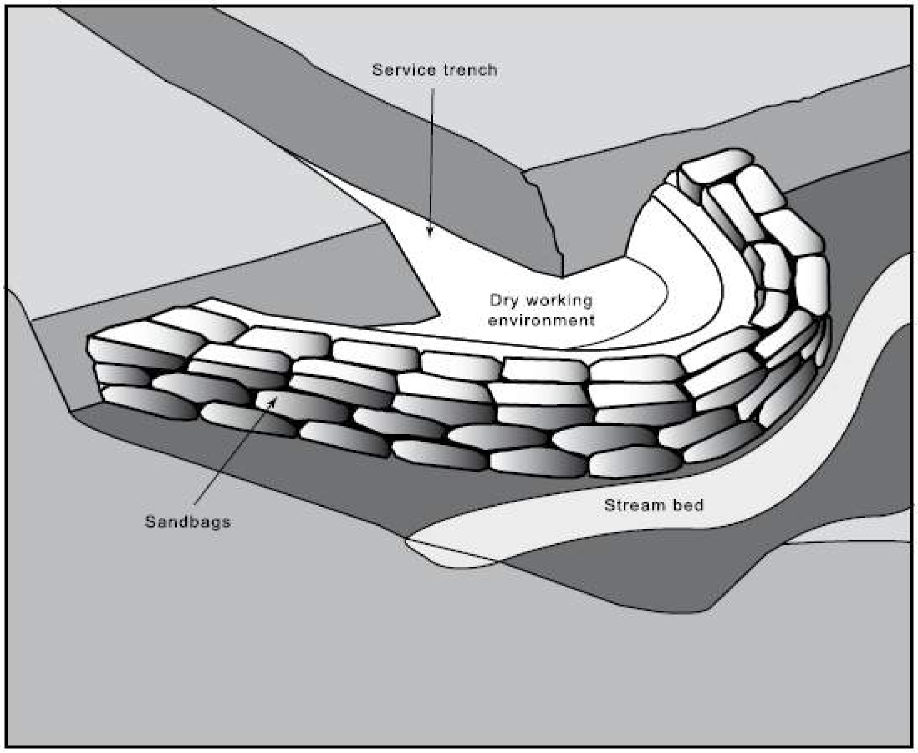

Figure 9.4: Example of Trenching in Vicinity of Wet Areas / Stream Bed

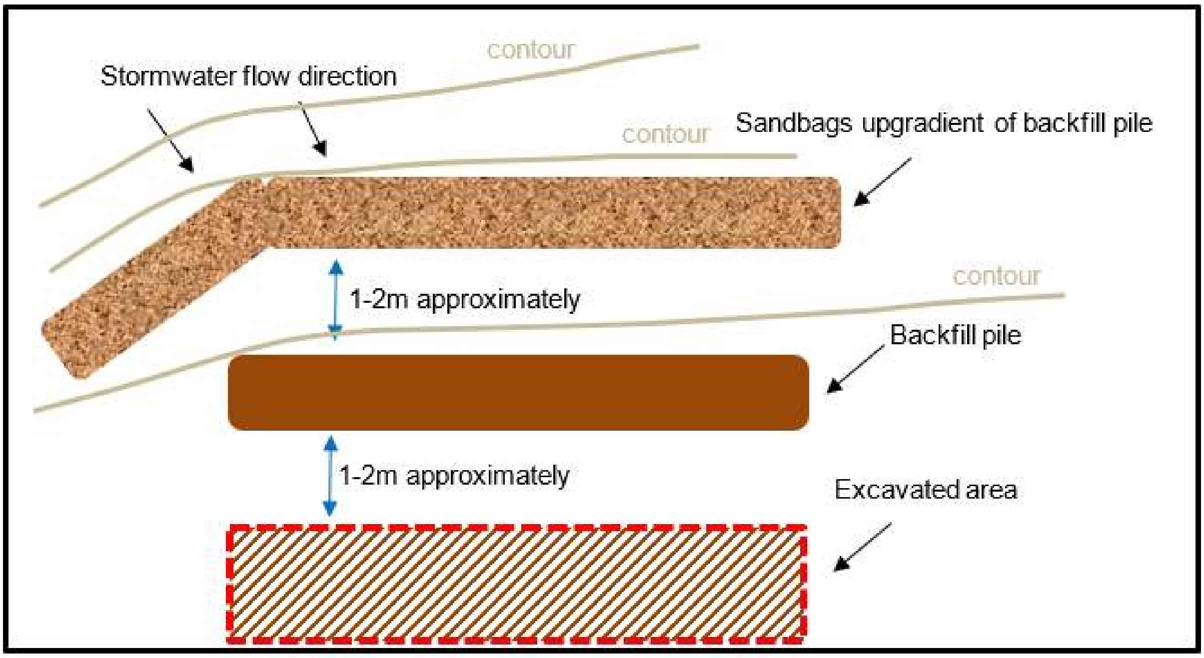

Figure 9.5: Site Specific Example Layout of Typical Trench / Excavation Working Section

Figure 9.6: Example of Silt Fence combined Sandbag Erosion Protection Barrier

9.3.2 Stage 2 Works

Stage 2 works are to be constructed in the Country Road and Taylors Road pavements. Examples of erosion control measures to be used adjacent to culverts are shown in the drawings in the Appendices and in Figures 9.7 and 9.8 below.

Figure 9.7: Example of Culvert and Sandbags

Figure 9.8: Grated Drain and Sandbags

9.3.3 Stage 3

Works in Stage 3 include low lying areas in close vicinity to wetlands and Watermill Creek and the coastline of Emily Bay and Slaughter Bay. Silt fencing will be erected along Pier Street and Bounty Street, and across the Golf Club. Additional precautions of silt fencing combined with sandbagging will be utilised in the lower lying areas in closest proximity to wetlands, and in other areas considered necessary. Drawings showing the extent of the proposed sandbagging and silt fences are presented in the Appendices.

Figures 9.9 - 8.13 below present the proposed erosion and sediment control treatment measures to mitigate potential effects on Watermill Creek and associated wetland areas in Pier Street and Bounty Street. Silt fencing located on the grass verge away from the road edge will enable enough space for low height backfill material piles between trench excavation and the silt fence. The lower lying section of the road where it crosses the culvert will also require sandbags to mitigate potential sediment run off into the wetland or Watermill Creek.

Figure 9.9: Pier Street, View North across Watermill Creek and Proposed Silt Fencing

Figure 9.10: Pier Street, Proposed ESC Measures at Watermill Creek Culvert

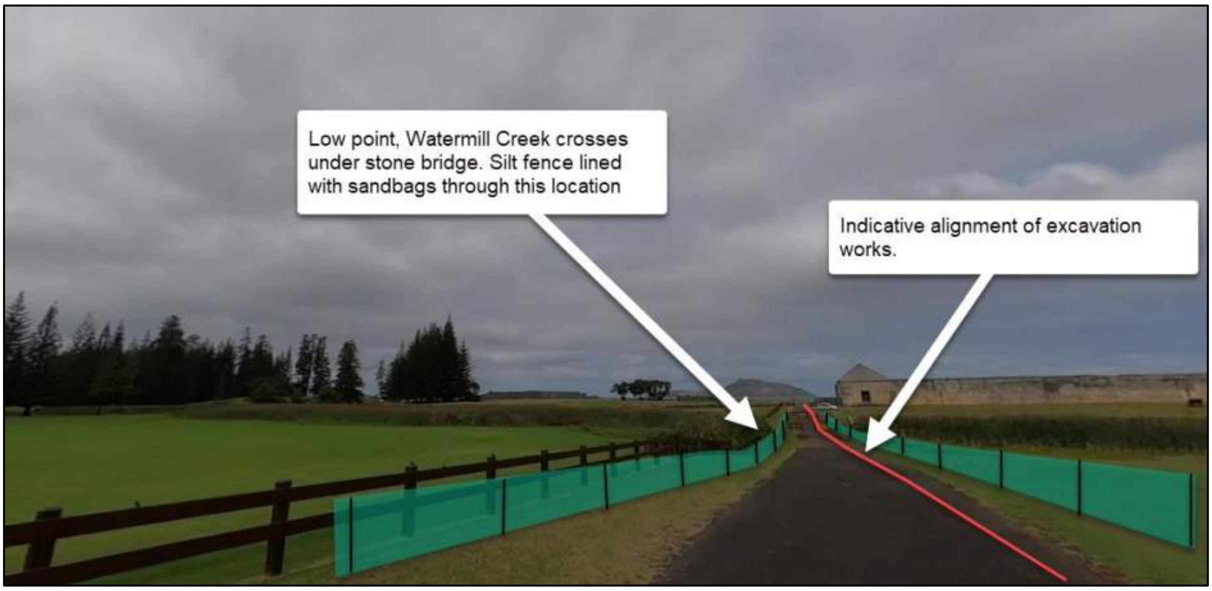

Figure 9.11 Bounty Street, View South across Watermill Creek

Silt fencing will also be placed along of the works from the Golf Club House as shown in the drawings in the Appendices to prevent silt runoff entering the golf course fairway.

Silt fencing and sandbags will be placed adjacent to the excavations behind Munnas and the REO buildings to prevent any silt laden runoff entering the Slaughter Bay beach area as shown on the drawings in the Appendices.

The works along Bay Street through the pine tree area towards the Lone Pine toilet building have no specified sediment and erosion control protection measures due to the ground topography preventing runoff going anywhere. Sandbags however, will be placed around the excavation for the Lone Pine pumping station to prevent any silt laden runoff entering the Emily Bay beach area.

9.4 Bedding, Backfilling and Reinstatement

Excavated material will be used as bedding and backfill where it is deemed as being suitable and following sieving where required. Where necessary clean suitable backfill material will be sourced from the Watermill Dam hardfill area, as required. This material will be tested for suitability to use prior to construction. A foot compactor and/or plate compactor will be used to compact backfilled material.

Any excess or unsuitable material will be transported to the existing hardfill area near Watermill Dam.

Kikuyu grass will grow over reinstated trenches quicky, reinstated areas will be irrigated as necessary to promote grass regrowth and to prevent dust erosion.

Road pavements gravels and surfacing will be reinstated to match existing.

9.5 Acid Sulphate Soils

9.5.1 Introduction

Acid Sulfate Soils (ASS) are potentially naturally occurring in the wetland areas including around Watermill Creek. These soils are unconsolidated sediments or organic accumulations (peat) in which sulfuric acid may be produced or has been produced when the soils are drained or exposed to oxygen. Examples of ASS around Watermill Creek are presented in Section 5.4.2 above.

Long-term management of these areas requires regular monitoring and reduction of additional inputs of sulfate.

Depending on the risk level and local conditions, acidification may be neutralised by applying alkaline products such as lime.

National Acid Sulfate Soils Guidance National Acid Sulfate Soils Sampling and Identification Methods Manual Australian Government Initiative July 2018 outlines the stages that should be followed prior to construction. These are desktop assessment, site assessment, sampling and testing.

A paper written by R Fitzpatrick, S Philip and B Thomas, February 2022 *Acid Sulfate Soil Fact Sheet for Norfolk Island* notes that the drought conditions in 2020 exposed ASS and that risks presented by ASS may be higher than indicated in documents prepared prior to this.

9.5.2 ASS Management Plan

A desktop assessment of CSIRO guidelines: - *Australia's National Science Agency - Norfolk Island Water Resource Assessment Summary Report 2020*, concludes that ASS are not likely to be present in the vicinity of the majority of pipeline routes in Stage 2. The lower stretches of Country Road up to Watermill Dam, and the lower lying sections of Pier Street and Bounty Street however have the potential for the presence of ASS.

The preferred strategy to deal with ASS is avoidance.

The next management strategy to be considered is minimisation of disturbance. Various mitigation measures can be taken to minimise disturbance.

If considered necessary, an Acid Sulphate Soil Management Plan for Stage 2 and Stage 3 of works should be prepared by an appropriately qualified and experienced soil scientist and include the following:

The Contractor will adhere to the Acid Sulfate Soil Management Plan (if required) and the following mitigation guidance set out in *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines*, Queensland Government Science Division will still be followed as a conservative approach. Mitigation is broken into two strategies - minimising disturbance and management.

Minimising Disturbance Strategies

- Open excavations will be small scale and the minimal time of that any short shallow sections of trenches are being exposed, mitigates the time in which soils are exposed to oxygen.
- Excavations will be less than 1m deep and should not be required to be dewatered or drained.
- If groundwater levels are not affected by earthworks, then potential ASS can be covered with clean fill.
- Using clean non-ASS fill instead of treated ASS on site, minimises risk. Clean fill will be used, sourced from the current Watermill Dam hardfill area and will be tested prior to construction. This strategy can be used to provide adequate clearance for building foundations, infrastructure trenches if ASS layers are located close to the soil surface. Using clean non-ASS fill instead of treated ASS on site minimises risk. Untreated ASS should not be used as pre-load material. *Queensland Acid Sulfate Soils Technical Manual: Soil Management Guidelin*e (Figures 7.1-7.2), recommends clean fill as presented in Figure 9.12 below.
- Construction activities that cause groundwater fluctuations, and in particular those that permanently lower the water table, and which may expose in situ sulfidic soils to oxygen, are avoided.
- Minimise the potential duration that ASS soils are exposed.
- Allow adequate time to test soils and treat if required.
- Enable sufficient space and appropriate location to accommodate volume of ASS soils requiring treatment.
- Any excavated material must be safely transported to a location away from watercourses to be treated as determined by an appropriately qualified and experienced soil scientist.
- Contingency measures - erosion sediment control measures will be in place.

At high-risk locations such as the lower lying sections of Pier Street and Bounty Street, and the stone culverts over Watermill Creek, where Fitzpatrick observed ASS in 2020, an appropriately qualified and experienced soil scientist will oversee the excavation works. In all other lower risk locations, in the event that soils are observed as potentially being ASS, then work will be stopped and an appropriately qualified and experienced soil scientist will be contacted to advise of actions required.

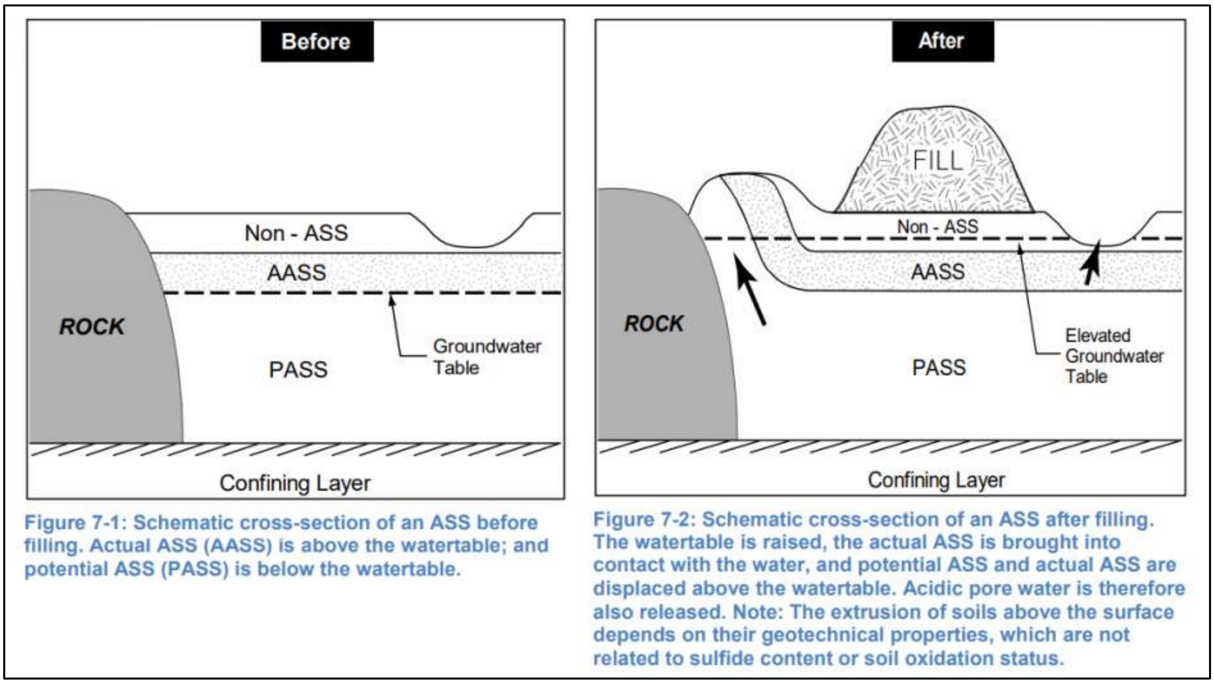

Figure 9.12: Clean Fill Covering ASS Material. Extracted from Queensland Acid Sulfate Soils. *Technical Manual: Soil Management Guideline*

Management Strategies

Once methods of minimising disturbance have been fully explored, the following risk-based management strategies are preferred for dealing with any unavoidable disturbances:

- Neutralisation of ASS.
- Hydraulic separation on its own or in conjunction with excavation.
- Strategic reburial of potential ASS at least one metre below the permanent water table, or several metres below the ground level.

10.0 Decommissioning and Waste Management Plan

10.1 Introduction

Decommissioning of existing onsite wastewater tanks at Surgeons Quarters, REO, Munnas, Prisoner Barracks, Slaughter Bay public toilets, Cemetery and Lone Pine toilets will be undertaken, in conjunction with the commissioning and construction of the new wastewater infrastructure.

Pump stations and interconnecting trunk pipelines will be constructed, tested and commissioned using the holding tanks to contain test water.

Details regarding the decommissioning methodology are presented in Section 10.4 below.

10.2 Construction Waste

Any waste related to construction and construction materials is likely to be wrapping from hardware components and general waste created by contractors. All waste will be stored in recycling / other bins in the stockpile area and removed from site daily and disposed of at the NIRC Waste Management Centre.

10.3 Removal of Hazardous Materials

No existing wastewater treatment or dispersal infrastructure will be removed from sites unless there is rock or other non penetrable material which makes this unfeasible.

The risk of transporting dirty septic tanks and associated pipework offsite and potentially off the island, and the associated costs are considered to outweigh the benefits of complete removal as any remaining pathogens passing through soils from the discharge of old onsite systems are rapidly removed and die off through filtration, adsorption, and natural attrition.

It is considered a lower risk to the receiving environment to empty and clean the septic tanks on site, and to then collapse them and backfill the cavities. This is discussed further below.

There will be no hazardous chemicals or materials required on site as part of construction or decommissioning processes.

10.4 Decommissioning of Septic Tanks

Immediately following the construction of, and connection of each property to the new wastewater system, a waste management contractor will be engaged to use a vacuum truck to empty the associated septic tank in situ.

Once emptied, septic tanks will be water blasted clean, re-emptied via the vacuum truck, and then collapsed using an excavator.

Collapsing will involve drilling a 150mm diameter hole into the bottom of the concrete tanks, then collapsing their sides and leaving in situ. The cavity will then be backfilled with existing excavated material, and additional fill material sourced from the Watermill Dam hardfill area as necessary.

As the disposal fields have already been disconnected from the septic tanks, no further works or disturbance of the old disposal field areas will be performed. Any remaining pathogens in the ground will die off naturally if they have not done so already.

Pipelines from the buildings to the old septic tanks will be diverted into the new pumping chambers. Any old redundant sections of pipe (which will be minimal in quantity) will be dug up, disinfected and removed from site to the Norfolk Island Waste Management Centre.

10.5 Summary

The management of wastewater removal and the decommissioning of existing septic tanks will mitigate any existing effluent leaching and associated impacts on the receiving environment.

Leaving cleaned out, decommissioned septic tanks in situ is considered to have minimal impacts on the receiving environment given they will be vacuumed and washed prior to being collapsed.

11.0 Operational Impacts and Mitigation

Operation and maintenance of the new wastewater system will be managed by contractors to be appointed by the Norfolk Island Regional Council.

Regular inspection and maintenance of the wastewater system including pump stations and their associated electrical components will be undertaken.

All components will be supplied and installed to meet Australian industry standards. As such any uncontrolled discharge from the wastewater scheme should not occur.

Description of the pumping station and wastewater scheme operation is presented in Section 6 of this report. In summary, most pump stations are sized to allow for at least one day's storage capacity at average dry weather flows. Furthermore, PS3 has enough emergency storage to contain 24 hours of average dry weather flows from all of the Stage 1 and Stage 3 KAVHA areas - i.e. a total of 68 equivalent tenements.

In the unlikely event of there being no power to the system for more than 24 continuous hours, then the water could also be turned off to the properties to limit any additional flows feeding into the pump stations.

Each pumping station will be supplied with OmniSmart controllers that will allow the pump set points to be adjusted if necessary and will convey any alarms to the scheme operator via the cellular network to require attendance on site. In the worst-case scenario, the operator will still be able to suck out the pumping stations and take any wastewater to the island's wastewater treatment plant in a septic tank vacuum truck.

The design of the wastewater system has been completed to mitigate any noise and/or odour emissions. The pumping stations and pumps are all located below the ground, mitigating any noise emissions.

The four Stage 2 trunk pumping stations will be vented through McBerns activated carbon odour filters located next to the switchboards. The termination manhole will also be vented through a McBerns odour filter.

All the Stage 3 pumping stations will be vented through their own vent pipelines fixed to the side of the associated building, above any potential flood level and fitted with odour filters if required. All connections leading to the pumping stations will be trapped, as they are currently leading to the septic tanks. Where there is potential for odour release at the air relief valves they will also be vented via McBerns odour filters thereby mitigating any odour release.

Spare components for the entire wastewater scheme will be retained by the contractor, in case of equipment failure. A list of suggested components to be kept on the Island as spares has been suggested by the supplier.

12.0 Key Personnel

- Construction Contractor and Operator - Island Plumbing & Gas - Andrew Barnett
- Norfolk Island Heritage Manager - to be confirmed.
- KAVHA Archaeologist - Tom Sapienza
- Soil Scientist - to be confirmed.
- Operation Manager for new wastewater system - to be confirmed.

13.0 References

Australian Government DEWHA - *Environment Protection and Biodiversity Conservation Act 1999, Guide to the Act.*

Bligh Tanner - *Improving the Water Quality of Emily Bay, Norfolk Island 2020*.

CSIRO Australia's National Science Agency - *Norfolk Island Water Resource Assessment Summary Report 2020.*

Australian Government Initiative - *National Acid Sulfate Soils Guidance National Acid Sulfate Soils Sampling and Identification Methods Manual July 2018.*

R Fitzpatrick, S Philip, B Thomas - *Acid Sulfate Soil Factsheet for Norfolk Island February 2022.*

Parson Brinkerhoff - *Norfolk Island Report on Geotechnical Soils Investigation 2005.*

Queensland Government Science Division - *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines.*

APPENDIX 1

Stage 2 and Stage 3 Wastewater Scheme Drawings and Pumping Station Drawings

NORFOLK ISLAND KAVHA WASTEWATER SCHEME

STAGE 2

CIVIL ENGINEERING DRAWINGS

Project No. 000770

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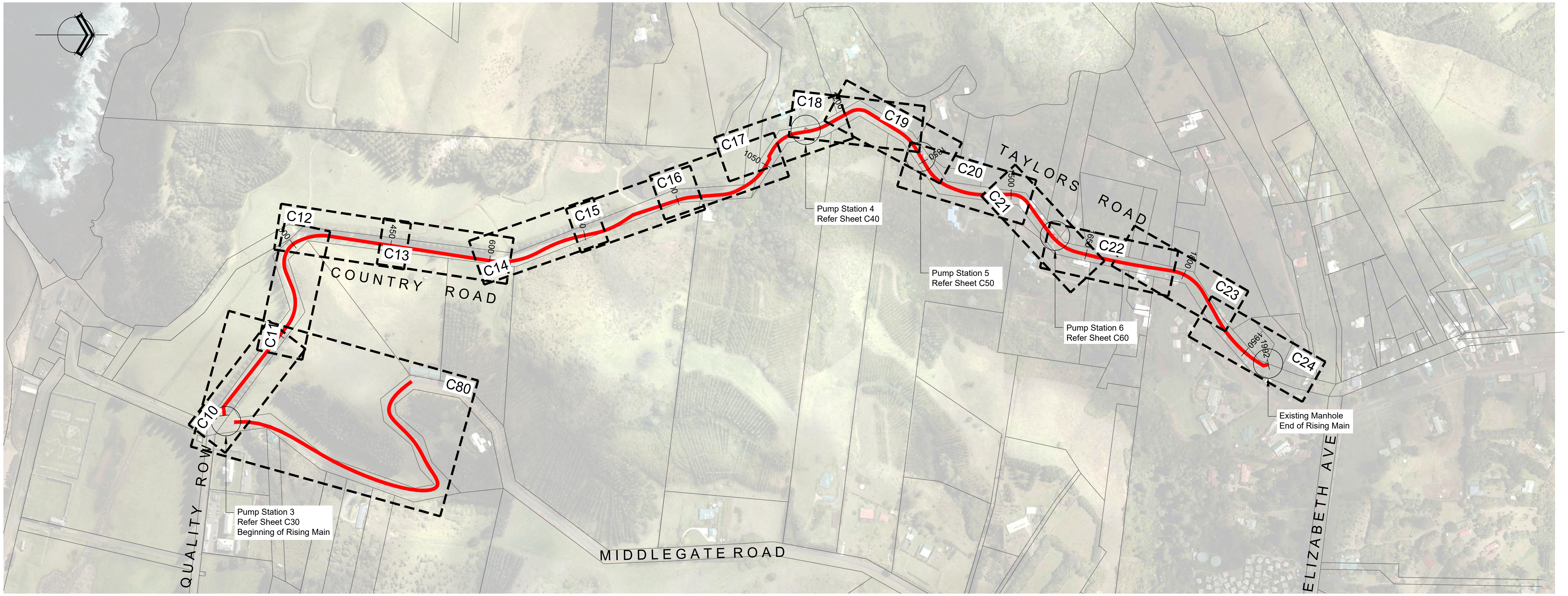
Sheet List Table

Sheet Number	Sheet Title	Rev
C01	General Arrangement	0
Pump Station 3 - Pump Station 4		
C10	Station 0-150	1
C11	Station 150-300	0
C12	Station 300-450	0
C13	Station 450-600	0
C14	Station 600-750	0
C15	Station 750-900	0
C16	Station 900-1050	0
C17	Station 1050-1200	0
Pump Station 4 - Pump Station 5		
C18	Station 0-100	0
C19	Station 100-200	0
Pump Station 5 - Pump Station 6		
C20	Station 0-150	0
C21	Station 150-256	0
Pump Station 6 - Existing Manhole		
C22	Station 0-150	0
C23	Station 150-300	0
C24	Station 300-400	0
Stage 2A - Pump Stations		
C30	Pump Station 3	0
C31	Pump Station 3 Details	0
C40	Pump Station 4	0
C41	Pump Station 4 Details	0
C50	Pump Station 5	0
C51	Pump Station 5 Details	0
C60	Pump Station 6	0
C61	Pump Station 6 Details	0
Details		
C70	Typical Details	0
C71	Typical Details	0
C72	Typical Details	0
Stage 2B - Middlegate Road		
C80	Stage 2B Layout Plan	0
C81	Stage 2B Longsections	0
C82	Stage 2B Longsections	0

ISSUED FOR CONSTRUCTION

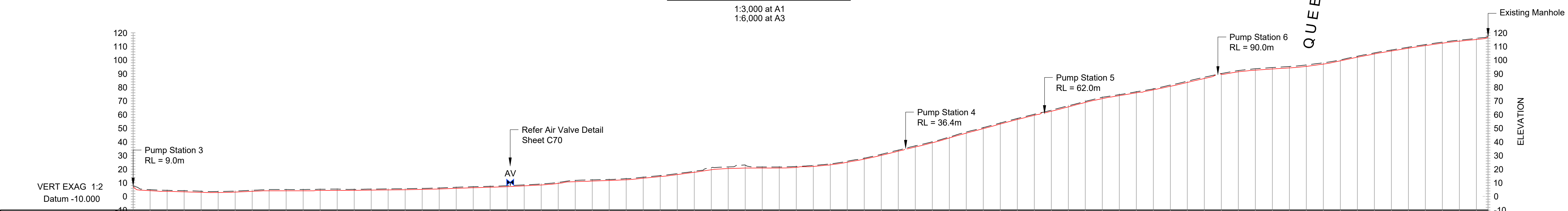
01/12/2023



QUEEN ELIZABETH AVE

GENERAL ARRANGEMENT

1:3,000 at A1
1:6,000 at A3



STATION (m)	0.00	25.00	50.00	75.00	100.00	125.00	150.00	175.00	200.00	225.00	250.00	275.00	300.00	325.00	350.00	375.00	400.00	425.00	450.00	475.00
GROUND LEVEL (m) (Existing)	7.55	4.93	4.47	4.21	3.83	3.63	3.94	4.51	5.05	5.08	5.10	5.27	5.39	5.15	5.41	5.51	5.67	5.89	6.22	6.72

STATION (m)	500.00	525.00	550.00	575.00	600.00	625.00	650.00	675.00	700.00	725.00	750.00	775.00	800.00	825.00	850.00	875.00	900.00	925.00	950.00	975.00
GROUND LEVEL (m) (Existing)	7.12	7.44	7.89	8.45	9.14	10.28	11.74	12.17	12.45	13.02	14.11	15.29	16.74	18.43	21.20	21.65	23.02	21.58	21.60	21.97

STATION (m)	1000.00	1025.00	1050.00	1075.00	1100.00	1125.00	1150.00	1175.00	1200.00	1225.00	1250.00	1275.00	1300.00	1325.00	1350.00	1375.00	1400.00	1425.00	1450.00	1475.00
GROUND LEVEL (m) (Existing)	22.75	23.86	25.83	28.07	30.88	33.95	37.09	40.09	43.51	47.27	50.49	53.85	57.15	60.28	63.22	66.41	69.71	72.65	74.64	76.74

STATION (m)	1500.00	1525.00	1550.00	1575.00	1600.00	1625.00	1650.00	1675.00	1700.00	1725.00	1750.00	1775.00	1800.00	1825.00	1850.00	1875.00	1900.00	1925.00	1950.00	1975.00	1992.16
GROUND LEVEL (m) (Existing)	78.89	81.69	84.51	87.43	90.13	92.31	93.62	94.49	95.29	96.42	98.01	100.11	102.83	105.25	107.38	109.47	111.35	113.15	114.61	115.92	117.38

RISING MAIN LONG SECTION

1:3,000 (h) 1:1,500 (v) at A1
1:6,000 (h) 1:3,000 (v) at A3

100 mm
75 mm
50 mm

Revision	Des	Drn	Rvd	App	Date
0 For Construction	ACS	ESG	ACS	ACS	29/11/23

Verify all dimensions on site before commencing work. Prioritise figured dimensions over scaling. Refer all discrepancies to the drawing office.

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
General Arrangement

Scale (A1 Original) 1:3000 m
Issue For Construction
Project No 000770 | **Sheet** C01 | **Revision** 0

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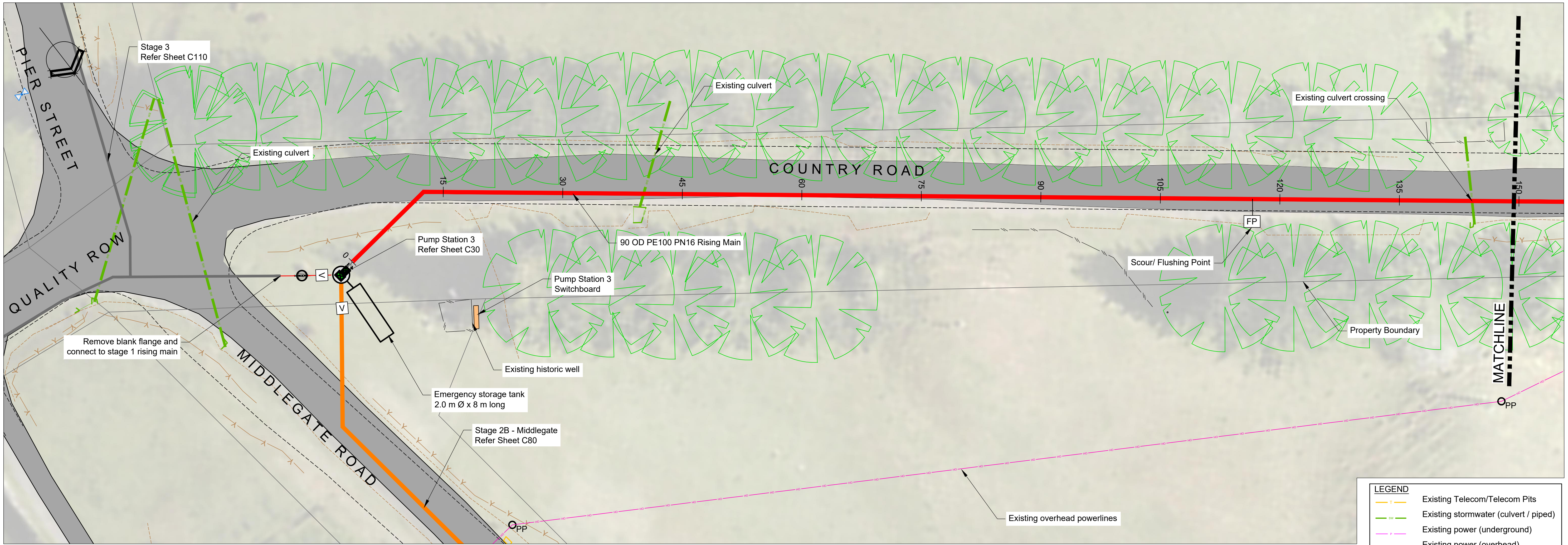
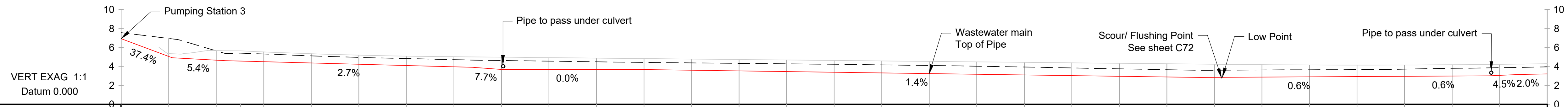


LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

LAYOUT PLAN 0-150

1:250 at A1
1:500 at A3



STATION (m)	0.00	5.00	10.00	12.54	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00
GROUND LEVEL (m) (Existing)		6.93	5.63	5.39	5.30	5.10	4.93	4.81	4.70	4.61	4.54	4.47	4.41	4.36	4.31	4.26
PIPE COVER (m)		1.90	0.98	0.84	0.81	0.75	0.72	0.73	0.75	0.94	0.87	0.81	0.76	0.78	0.80	0.82
PIPE TYPE	90OD PE100 HDPE PN16															

STATION (m)	75.00	80.00	85.00	90.00	95.00	100.00	105.00	110.00	115.00	120.00	125.00	130.00	135.00	140.00	145.00	
GROUND LEVEL (m) (Existing)	4.21	4.15	4.08	4.01	3.93	3.83	3.73	3.64	3.58	3.61	3.63	3.65	3.70	3.78	3.85	
PIPE COVER (m)	0.84	0.85	0.86	0.85	0.84	0.81	0.78	0.77	0.75	0.75	0.74	0.73	0.76	0.81	0.81	0.74
PIPE TYPE	90OD PE100 HDPE PN16															

LONGSECTION 0 - 150

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
1	For Construction	ACS	ANS	ACS	ACS	01/12/23
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original) 1:250 m
Issue For Construction
Project No 000770
Sheet C10
Revision 1

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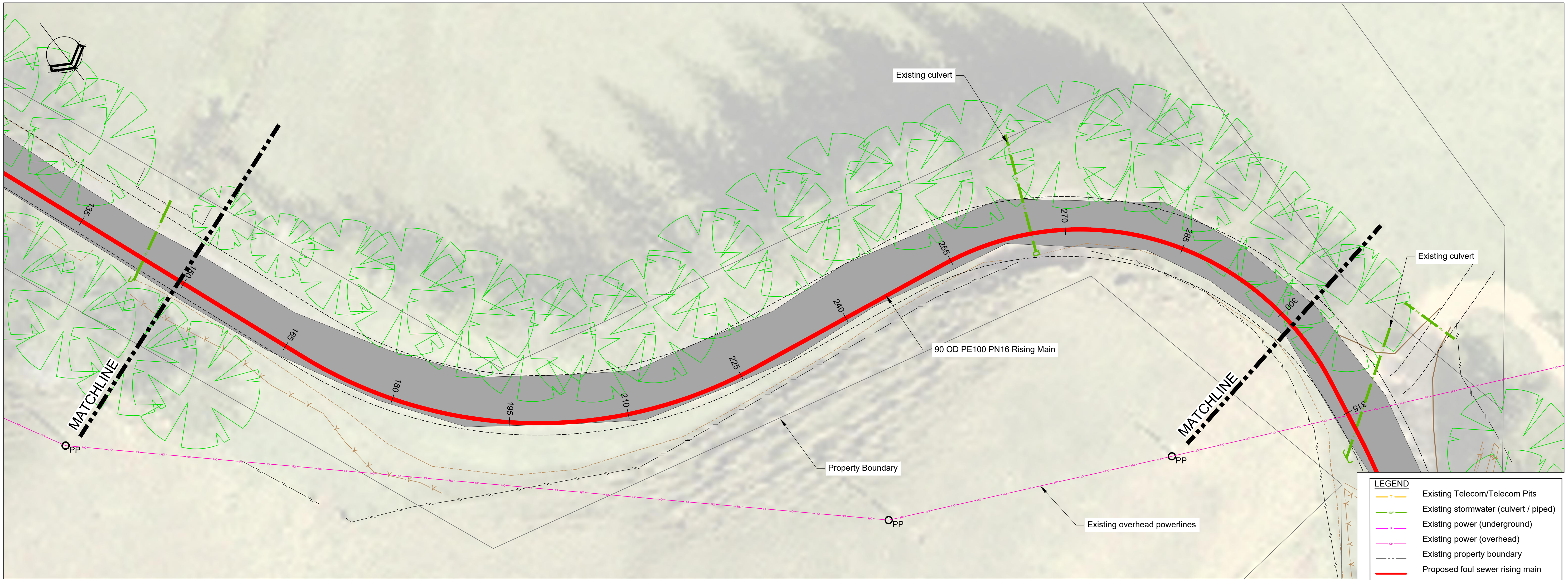
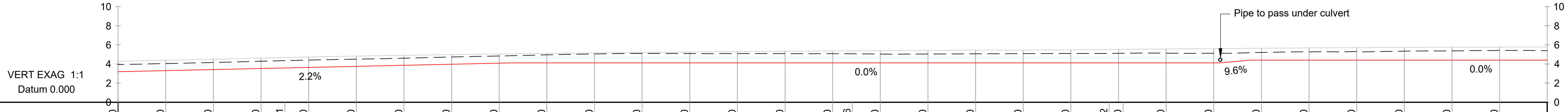


LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

LAYOUT PLAN 150 - 300

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
150.00	3.94	0.74
155.00	4.04	0.74
160.00	4.15	0.73
165.00	4.28	0.76
167.51	4.35	0.76
170.00	4.40	0.77
175.00	4.51	0.76
180.00	4.60	0.74
185.00	4.73	0.76
190.00	4.83	0.75
195.00	4.95	0.84
200.00	5.05	0.94
205.00	5.10	0.99
210.00	5.09	0.98
215.00	5.09	0.98
220.00	5.08	0.97
225.00	5.08	0.97
227.06	5.06	0.95
230.00	5.04	0.93
235.00	5.04	0.93
240.00	5.06	0.95
245.00	5.08	0.97
250.00	5.10	0.99
254.02	5.10	0.99
255.00	5.11	1.00
260.00	5.13	1.02
265.00	5.12	1.01
270.00	5.20	0.80
275.00	5.27	0.87
280.00	5.29	0.89
285.00	5.34	0.94
290.00	5.36	0.96
295.00	5.41	1.01
		0.99

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 150 - 300

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client: Australian Government, Department of Infrastructure, Transport, Regional Development and Communications

Project Title: Norfolk Island
KAVHA Wastewater Scheme

Sheet Title: Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original): 1:250 m

Issue: For Construction

Project No	Sheet	Revision
000770	C11	0

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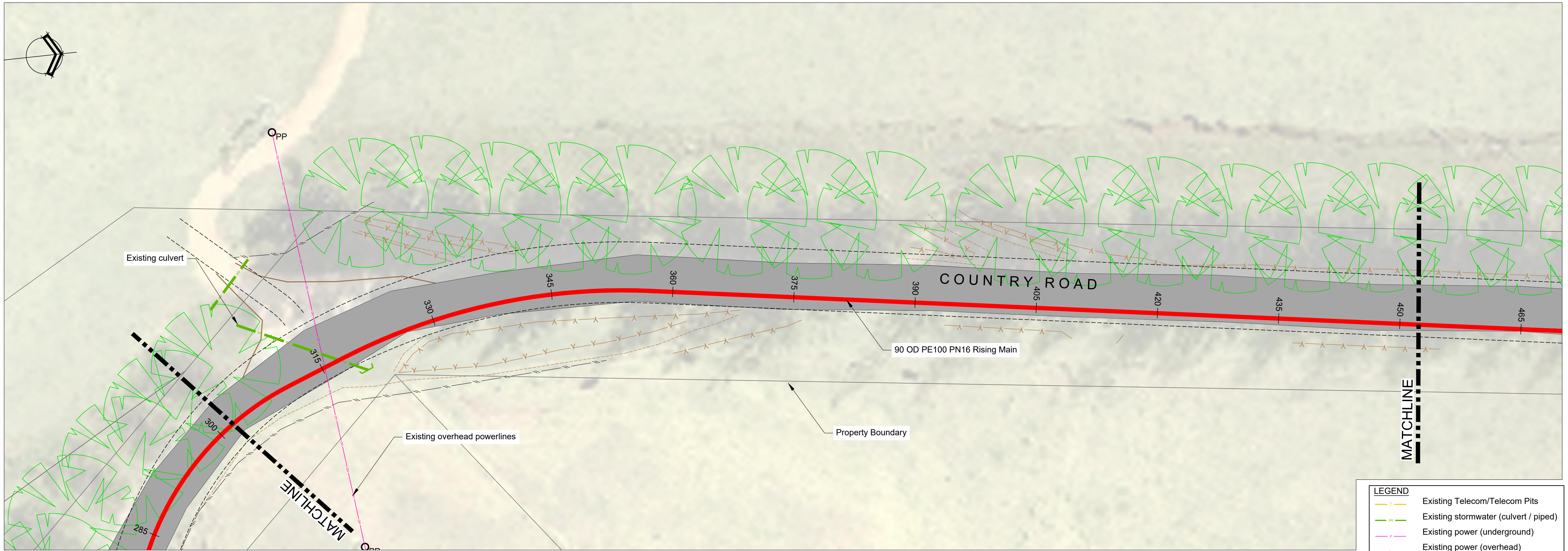
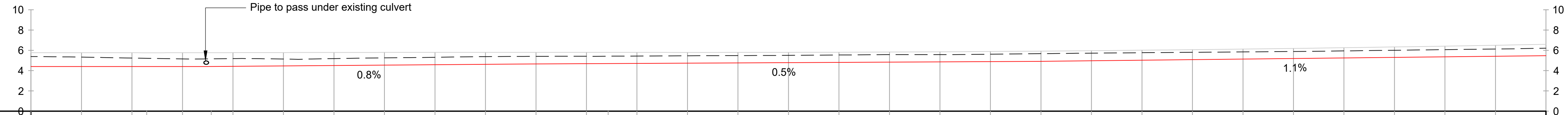


LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

LAYOUT PLAN 300-450

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
300.00	5.77	0.99
305.00	5.77	0.93
310.00	5.77	0.84
310.42	5.23	0.83
315.00	5.77	0.75
317.85	5.16	0.76
320.00	5.78	0.77
325.00	5.79	0.68
330.00	5.79	0.69
335.00	5.80	0.72
340.00	5.80	0.74
345.00	5.80	0.76
350.00	5.80	0.75
355.00	5.80	0.73
357.15	5.43	0.73
360.00	5.80	0.73
365.00	5.80	0.73
370.00	5.80	0.72
375.00	5.81	0.72
380.00	5.82	0.73
385.00	5.84	0.73
390.00	5.86	0.71
395.00	5.89	0.72
400.00	5.93	0.75
405.00	5.97	0.75
410.00	6.02	0.74
415.00	6.07	0.72
420.00	6.13	0.70
425.00	6.19	0.69
430.00	6.26	0.69
435.00	6.34	0.70
440.00	6.42	0.71
445.00	6.51	0.72
		0.74

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 300-450

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client: Australian Government, Department of Infrastructure, Transport, Regional Development and Communications

Project Title: Norfolk Island
KAVHA Wastewater Scheme

Sheet Title: Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original): 1:250 m
Issue: For Construction
Project No: 000770
Sheet: C12
Revision: 0

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&36_Drawings\04_Production\000770 Norfolk C01-C17_PS3-PS4

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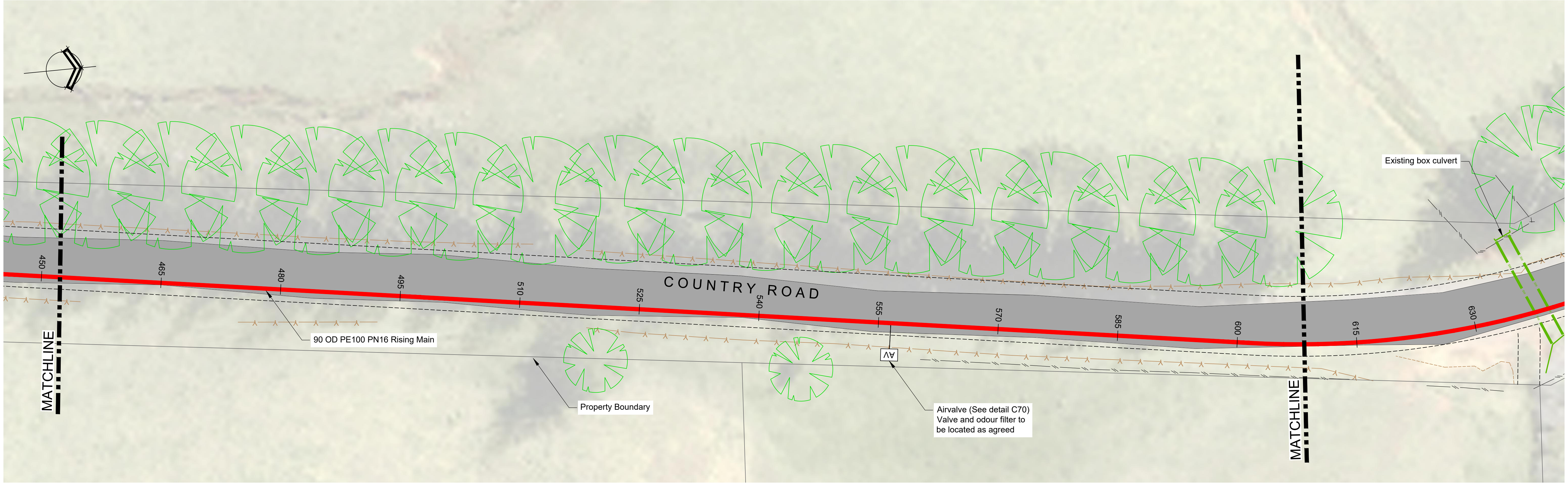
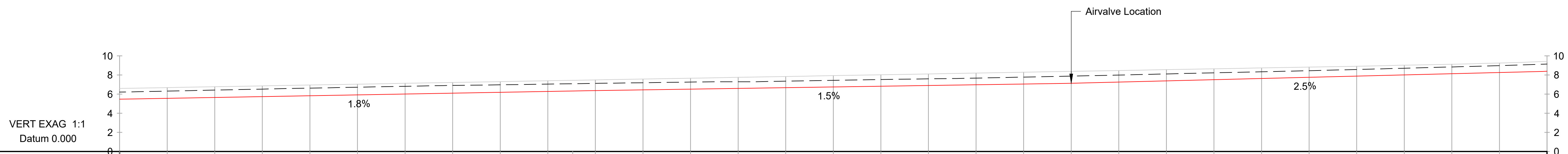


LAYOUT PLAN 450-600

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface



STATION (m)	450.00	455.00	460.00	465.00	470.00	475.00	480.00	485.00	490.00	495.00	497.61	500.00	505.00	510.00	515.00	520.00
GROUND LEVEL (m) (Existing)	6.59	6.68	6.77	6.86	6.95	7.04	7.13	7.22	7.31	7.40	7.09	7.49	7.58	7.67	7.76	7.84
PIPE COVER (m)	0.74	0.76	0.77	0.79	0.80	0.80	0.81	0.81	0.78	0.76	0.76	0.75	0.74	0.73	0.69	0.68
PIPE TYPE	90OD PE100 HDPE PN16															

STATION (m)	525.00	530.00	535.00	540.00	545.00	550.00	555.00	560.00	565.00	570.00	575.00	580.00	585.00	590.00	595.00	
GROUND LEVEL (m) (Existing)	7.93	8.02	8.11	8.20	8.29	8.38	8.47	8.56	8.65	8.74	8.83	8.92	9.02	9.12	9.25	
PIPE COVER (m)	0.69	0.69	0.70	0.70	0.72	0.75	0.73	0.72	0.72	0.70	0.69	0.69	0.70	0.71	0.71	0.75
PIPE TYPE																

LONGSECTION 450-600

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

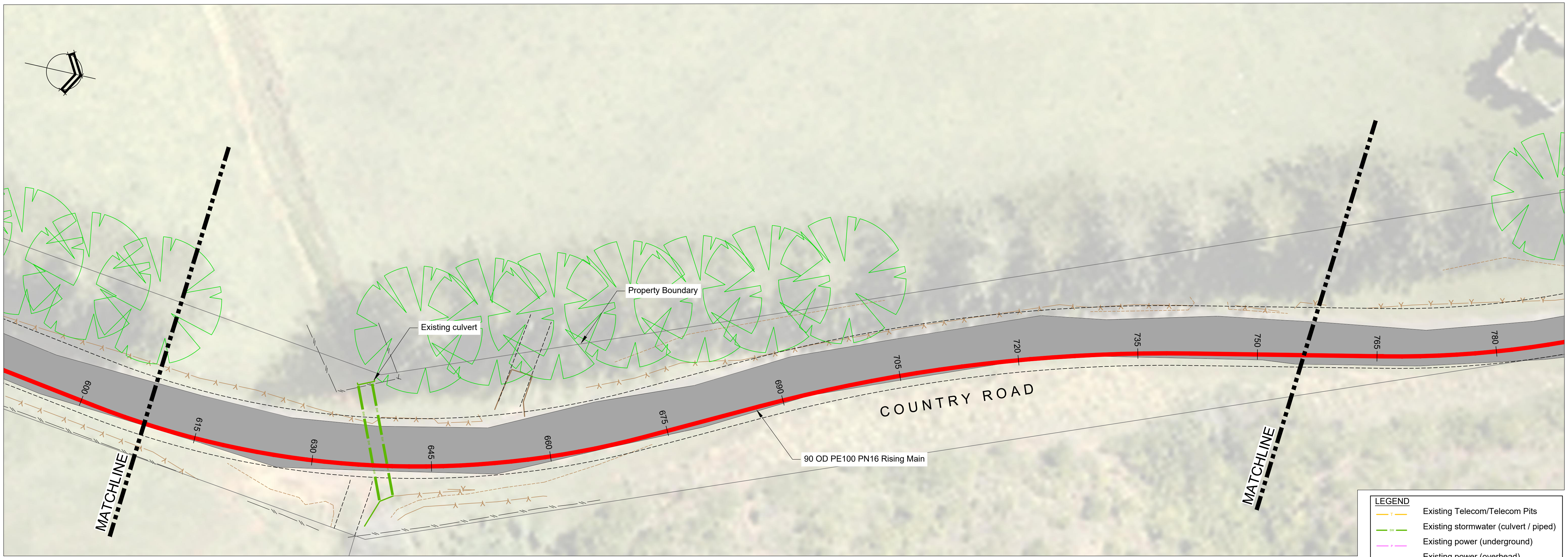
Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original) 1:250 m
Issue: For Construction
Project No: 000770
Sheet: C13
Revision: 0

0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk C01-C17_PS3-PS4

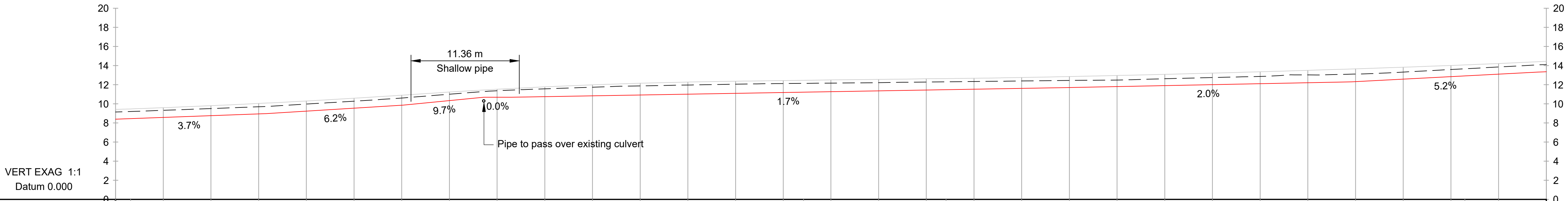


LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

LAYOUT PLAN 600-750

1:250 at A1
1:500 at A3



STATION (m)	600.00	601.57	605.00	610.00	615.00	620.00	625.00	630.00	635.00	640.00	645.00	650.00	655.00	660.00	665.00
GROUND LEVEL (m) (Existing)	9.42	9.20	9.60	9.81	10.04	10.30	10.59	10.90	11.23	11.52	11.77	11.98	12.15	12.28	12.37
PIPE COVER (m)	0.75	0.75	0.75	0.75	0.75	0.74	0.73	0.75	0.67	0.68	0.82	0.91	0.96	0.96	0.96

STATION (m)	670.00	672.12	675.00	680.00	685.00	687.07	690.00	695.00	700.00	705.00	710.00	715.00	720.00	725.00	730.00	735.00	740.00	741.46	745.00	
GROUND LEVEL (m) (Existing)	12.43	12.14	12.50	12.56	12.62	12.30	12.68	12.76	12.86	12.97	13.08	13.21	13.35	13.50	13.66	13.83	14.02	13.67	14.21	
PIPE COVER (m)	0.94	0.92	0.90	0.86	0.84	0.83	0.81	0.78	0.74	0.68	0.72	0.75	0.76	0.82	0.79	0.74	0.75	0.75	0.75	0.75

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 600-750

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original) 1:250 m
Issue For Construction

Project No	Sheet	Revision
000770	C14	0

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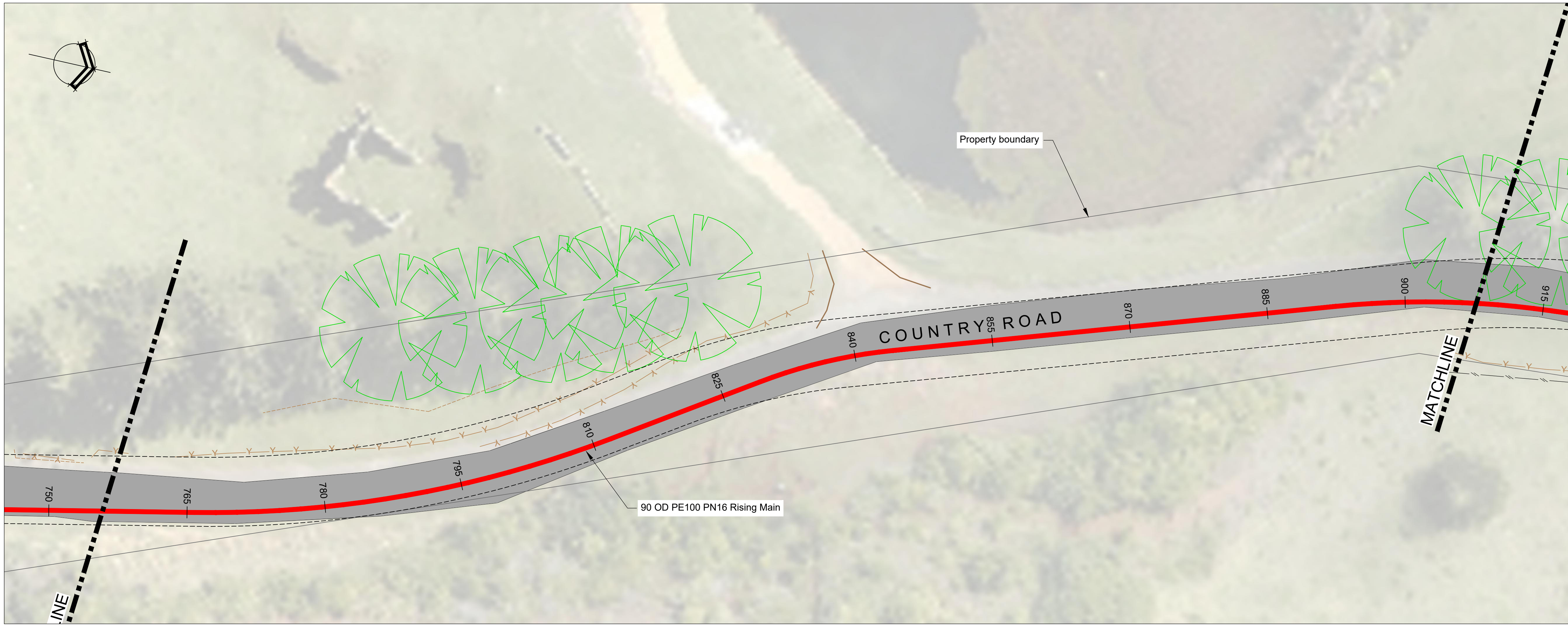
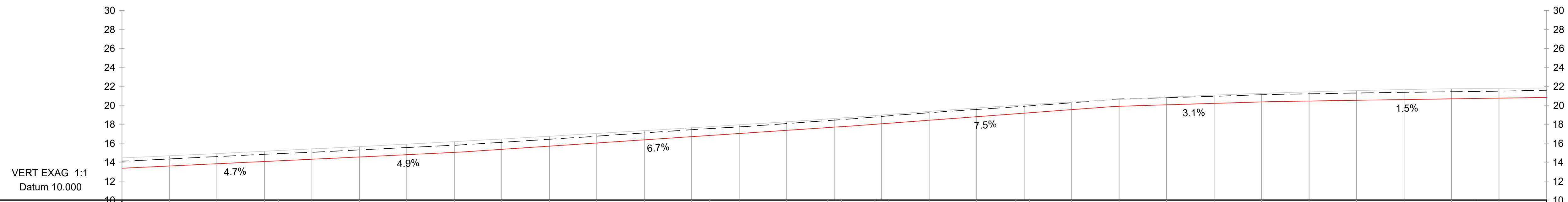


LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

LAYOUT PLAN 750-900

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
750.00	14.11	0.75
755.00	14.34	0.74
760.00	14.59	0.75
765.00	14.83	0.76
765.81	14.87	0.76
770.00	15.04	0.74
775.00	15.29	0.75
780.00	15.54	0.75
785.00	15.78	0.75
790.00	16.09	0.74
795.00	16.41	0.72
800.00	16.74	0.72
805.00	17.08	0.73
810.00	17.42	0.73
811.89	17.54	0.72
815.00	17.71	0.69
820.00	18.07	0.71
824.32	18.38	0.73
825.00	18.43	0.74
829.30	18.76	0.77
830.00	18.82	0.77
835.00	19.21	0.79
840.00	19.56	0.76
844.13	19.83	0.73
845.00	19.89	0.72
850.00	20.26	0.72
855.00	20.65	0.76
860.00	20.79	0.75
865.00	20.94	0.74
870.00	21.10	0.75
875.00	21.20	0.76
880.00	21.29	0.77
885.00	21.36	0.76
890.00	21.42	0.74
892.48	21.45	0.73
895.00	21.48	0.73
		0.76

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 750-900

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client: Australian Government, Department of Infrastructure, Transport, Regional Development and Communications

Project Title: Norfolk Island
KAVHA Wastewater Scheme

Sheet Title: Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original): 1:250 m

Issue: For Construction

Project No: 000770 | Sheet: C15 | Revision: 0

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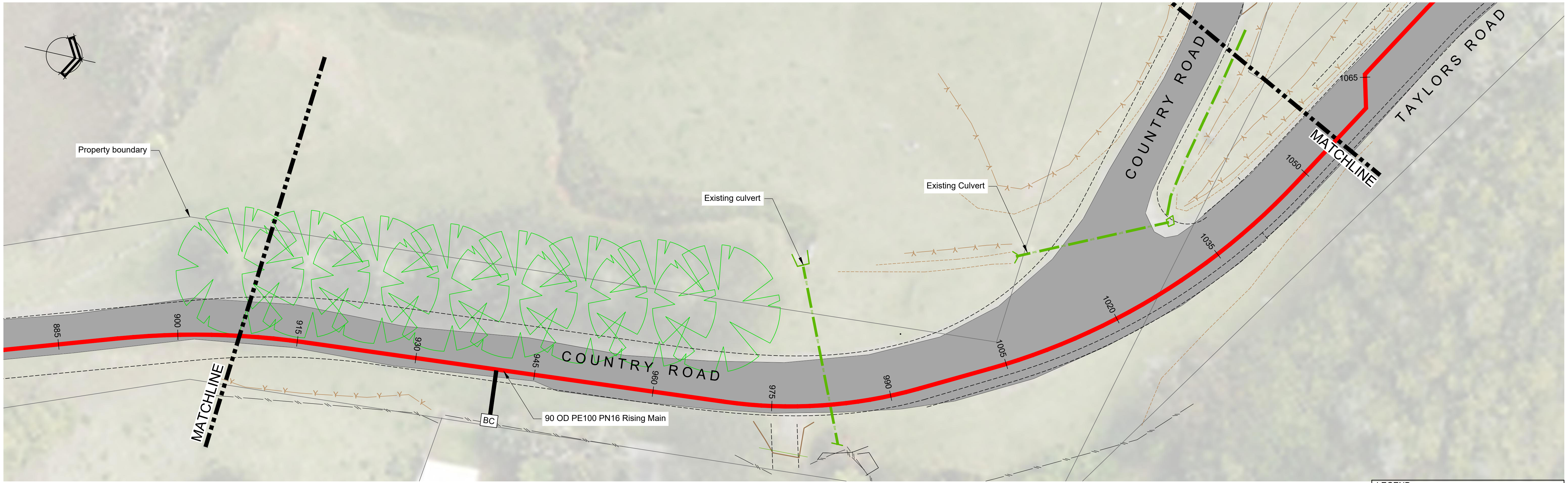
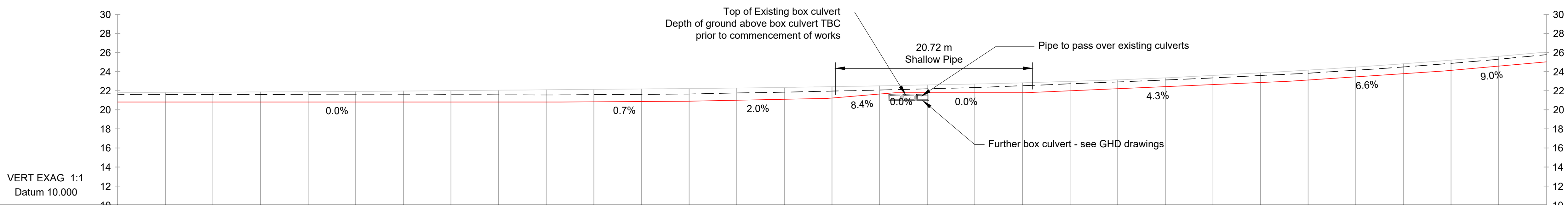


LAYOUT PLAN 900-1050

1:250 at A1
1:500 at A3



STATION (m)	900.00	905.00	910.00	915.00	915.97	920.00	925.00	930.00	935.00	940.00	945.00	950.00	955.00	960.00	965.00	969.09	970.00	975.00
GROUND LEVEL (m) (Existing)	21.81	21.83	21.86	21.88	21.60	21.90	21.93	21.97	22.02	22.06	22.10	22.15	22.19	22.23	22.28	21.83	22.35	22.43
PIPE COVER (m)	0.76	0.79	0.79	0.79	0.78	0.77	0.77	0.77	0.77	0.76	0.75	0.76	0.75	0.75	0.76	0.74	0.74	0.73

STATION (m)	980.00	985.00	990.00	993.47	993.74	995.00	1000.00	1002.81	1005.00	1010.00	1015.00	1020.00	1025.00	1030.00	1035.00	1040.00	1045.00	1048.35	
GROUND LEVEL (m) (Existing)	22.52	22.61	22.71	22.47	22.48	22.83	22.99	22.84	23.15	23.35	23.61	23.88	24.17	24.48	24.83	25.21	25.62	25.63	
PIPE COVER (m)	0.42	0.41	0.54	0.68	0.69	0.74	0.73	0.73	0.71	0.70	0.70	0.74	0.71	0.70	0.71	0.74	0.72	0.74	0.75

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 900-1050

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

0 100 mm

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client: Australian Government, Department of Infrastructure, Transport, Regional Development and Communications

Project Title: Norfolk Island
KAVHA Wastewater Scheme

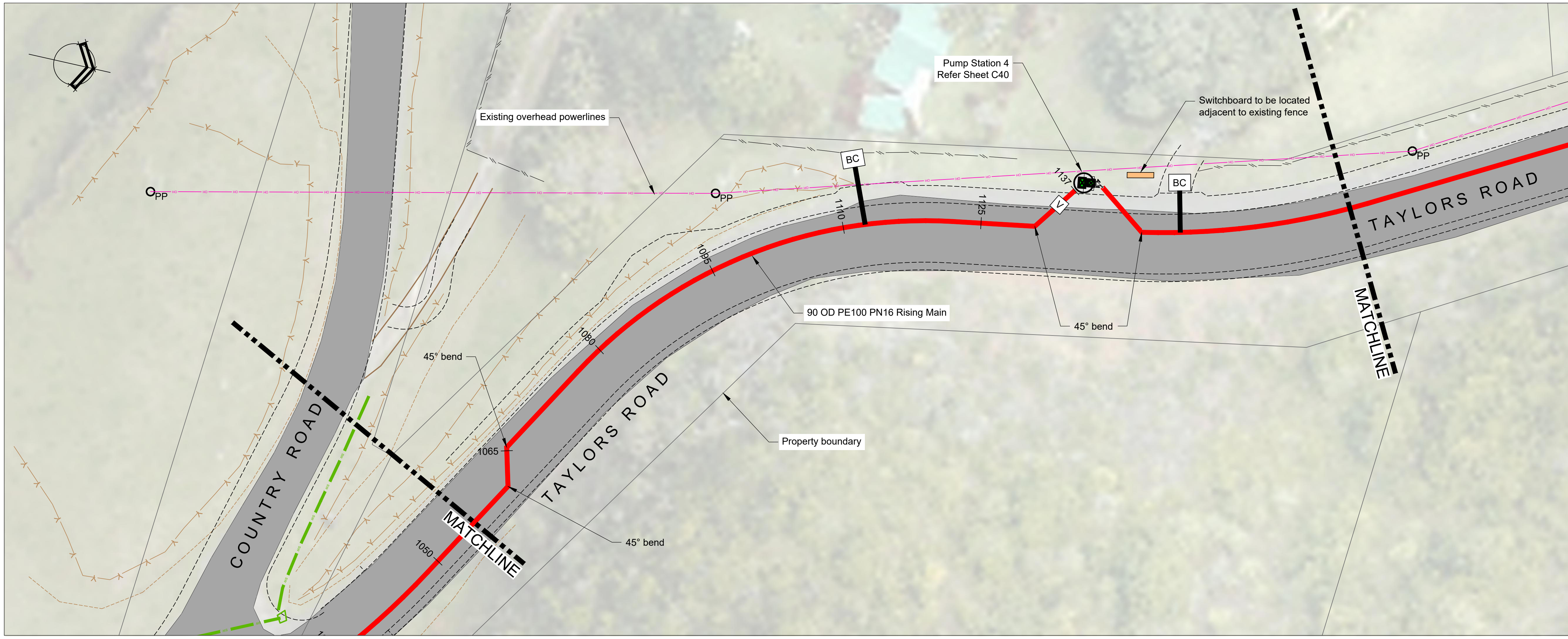
Sheet Title: Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original): 1:250 m

Issue: For Construction

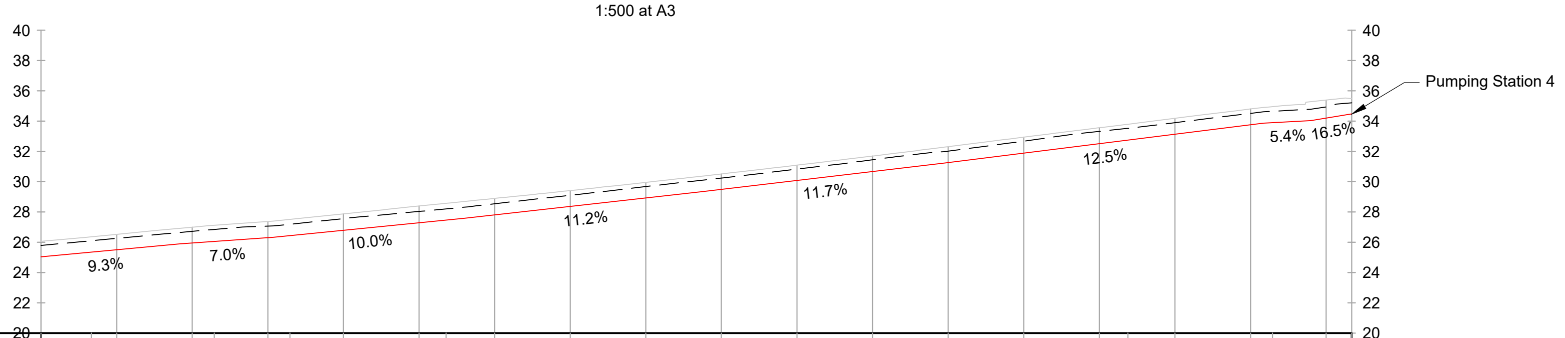
Project No	Sheet	Revision
000770	C16	0

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&36_Drawings\04_Production\000770 Norfolk C01-C17_PS3-PS4



LAYOUT PLAN 1050-1137

1:250 at A1
1:500 at A3



VERT EXAG 1:1
Datum 20.000

STATION (m)	1050.00	1053.33	1055.00	1060.00	1061.13	1065.00	1065.38	1070.00	1075.00	1076.79	1080.00	1085.00	1090.00
GROUND LEVEL (m) (Existing)	26.05	26.10	26.52	26.99	26.82	27.37	27.07	27.87	28.39	28.20	28.89	29.41	29.95
PIPE COVER (m)	0.75	0.75	0.75	0.77	0.79	0.76	0.75	0.77	0.74	0.73	0.73	0.73	0.75
PIPE TYPE	90OD PE100 HDPE PN16												

STATION (m)	1095.00	1100.00	1105.00	1110.00	1115.00	1120.00	1121.88	1125.00	1130.00	1130.84	1135.00	1136.69
GROUND LEVEL (m) (Existing)	30.51	31.09	31.69	32.31	32.93	33.56	33.52	34.18	34.80	34.61	35.38	
PIPE COVER (m)	0.74	0.75	0.78	0.75	0.79	0.81	0.78	0.76	0.75	0.75	0.73	0.73
PIPE TYPE												

LONGSECTION 1050-1137

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

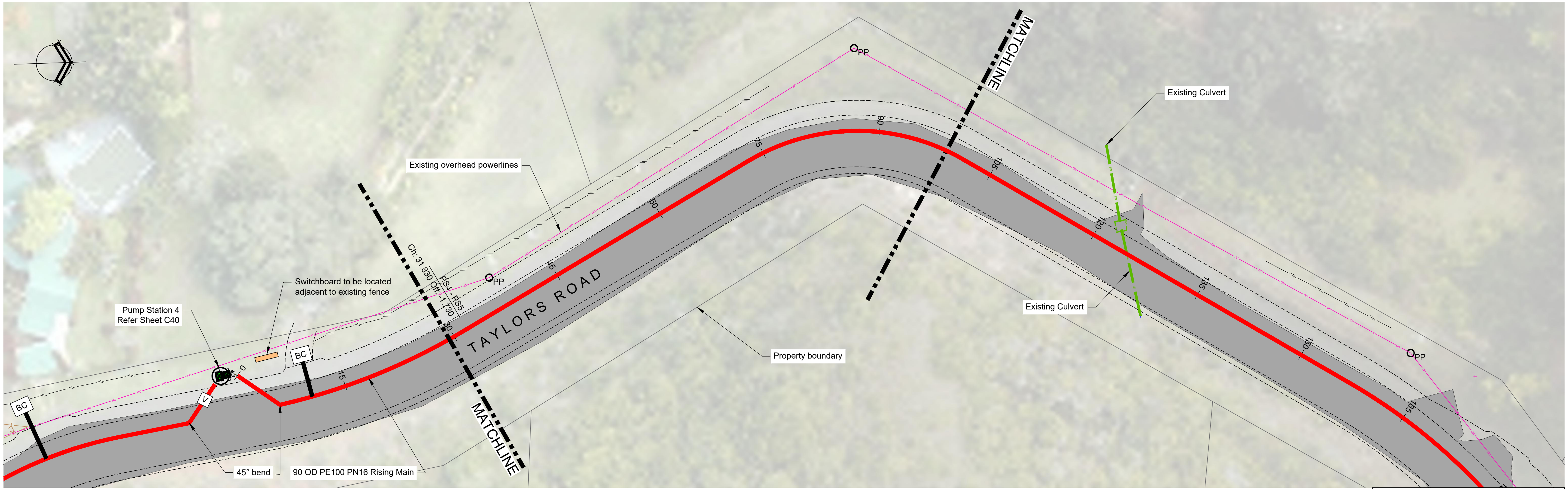
Sheet Title
Pumpstation 3 to Pumpstation 4
Layout Plan and Longsection

Scale (A1 Original) 1:250 m
Issue For Construction

Project No	Sheet	Revision
000770	C17	0

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk C01-C17_PS3-PS4

100 mm
75 mm
50 mm 40 30 20 10 0

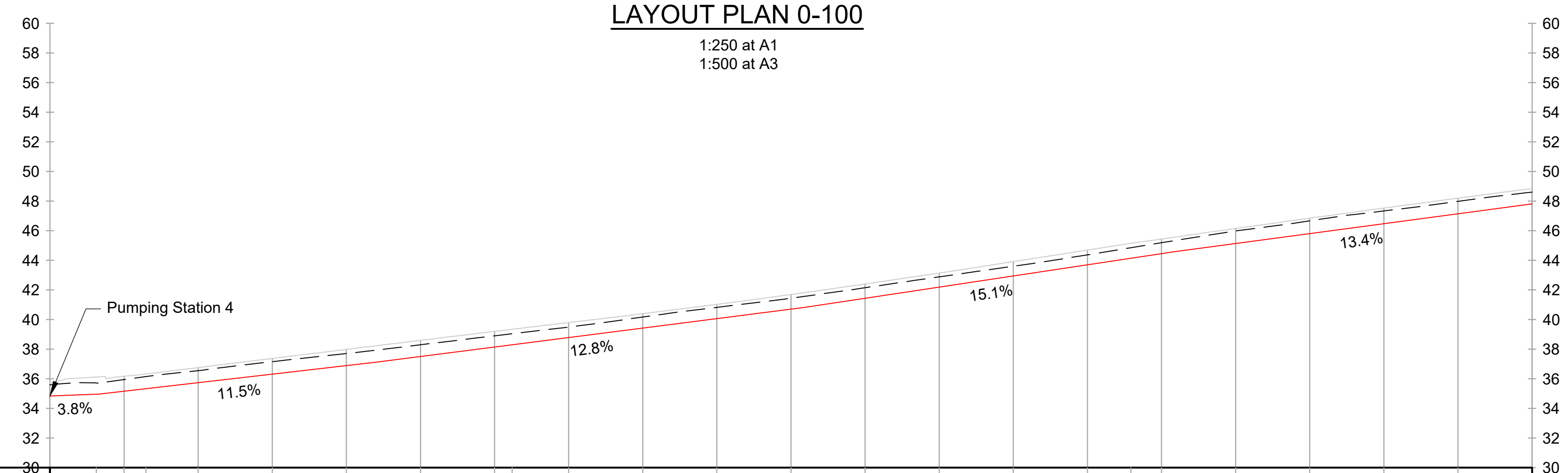


LAYOUT PLAN 0-100

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV — Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface



STATION (m)		3.13	5.00	6.47	10.00	15.00	20.00	25.00	30.00	31.19	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	72.93	75.00	80.00	85.00	90.00	95.00	
GROUND LEVEL (m) (Existing)		35.71	36.16	36.14	36.75	37.37	37.98	38.59	39.19	39.04	39.79	40.39	41.02	41.69	42.39	43.13	43.91	44.69	44.85	45.43	46.15	46.84	47.52	48.19	
PIPE COVER (m)	0.75	0.75	0.79	0.82	0.81	0.85	0.82	0.80	0.76	0.75	0.71	0.75	0.76	0.74	0.71	0.70	0.66	0.67	0.71	0.74	0.85	0.86	0.86	0.84	0.79
PIPE TYPE	90OD PE100 HDPE PN16																								

LONGSECTION 0-100

1:250 at A1
1:500 at A3

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

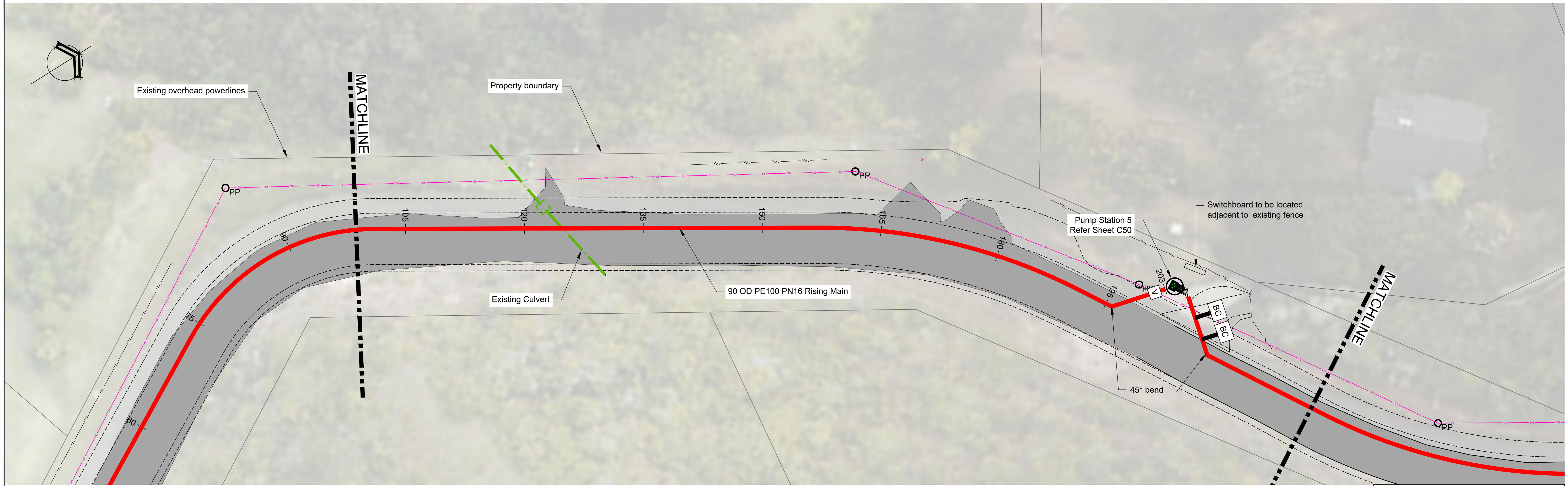
Sheet Title
Pumpstation 4 to Pumpstation 5
Layout Plan and Longsection

Scale (A1 Original) 1:250 m
Issue For Construction

Project No	Sheet	Revision
000770	C18	0

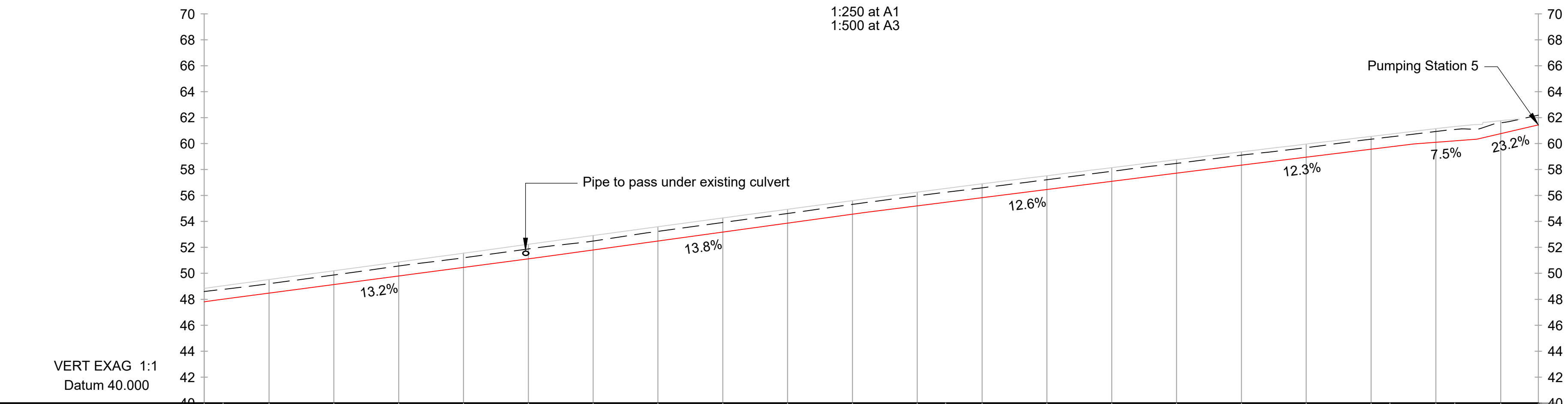
0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk C18_PS4-PS5



LAYOUT PLAN 100-203

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
100.00	48.60	0.79
101.10	48.72	0.77
105.00	49.20	0.73
110.00	49.87	0.74
115.00	50.56	0.77
120.00	51.20	0.74
125.00	51.88	0.76
130.00	52.49	0.69
135.00	53.24	0.75
140.00	53.92	0.74
145.00	54.61	0.74
150.00	55.32	0.75
155.00	55.97	0.77
157.18	56.25	0.77
160.00	56.59	0.76
165.00	57.22	0.76
170.00	57.86	0.77
175.00	58.47	0.75
180.00	59.11	0.77
185.00	59.68	0.73
190.00	60.34	0.77
190.98	60.45	0.76
195.00	60.93	0.83
195.83	61.03	0.87
200.00	61.60	0.83
202.90		0.75
202.90		

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 100-203

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

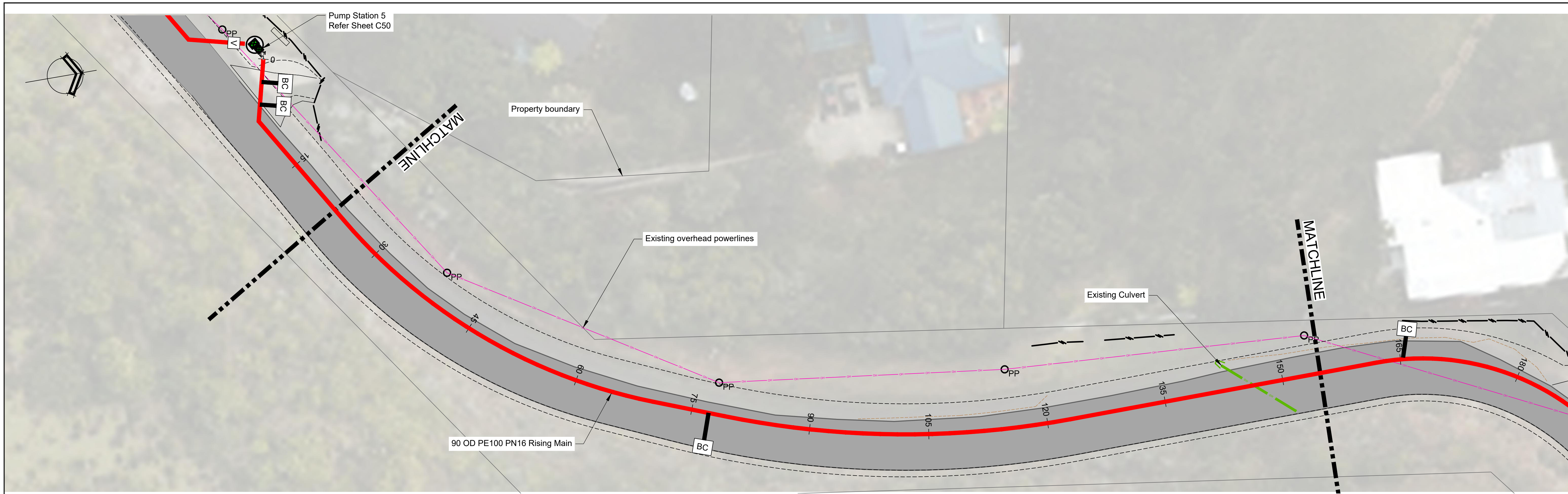
Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 4 to Pumpstation 5
Layout Plan and Longsection

Scale (A1 Original) 1:250 m
Issue For Construction
Project No 000770 | **Sheet** C19 | **Revision** 0

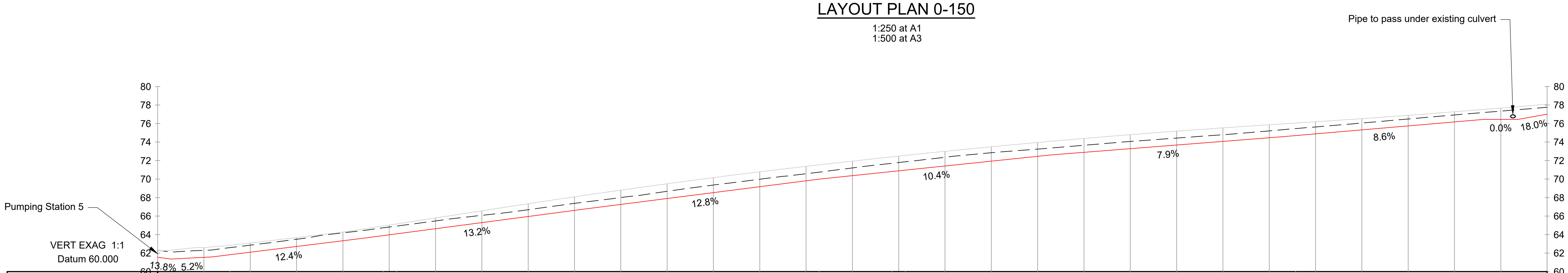
File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk C18_PS4-PS5

0 10 20 30 40 50 mm 75 mm 100 mm



LAYOUT PLAN 0-150

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
		0.75
5.00	62.59	0.76
7.81	62.59	0.76
10.00	63.09	0.76
15.00	63.67	0.78
20.00	64.27	0.85
24.34	64.73	0.84
25.00	65.02	0.84
30.00	65.80	0.84
35.00	66.57	0.78
40.00	67.33	0.73
45.00	68.08	0.76
50.00	68.80	0.75
55.00	69.49	0.78
60.00	70.15	0.82
65.00	70.78	0.80
69.95	70.57	0.76
70.00	71.37	0.76
75.00	71.93	0.83
79.28	71.71	0.89
80.00	72.48	0.90
85.00	72.99	0.94
90.00	73.49	0.91
95.00	73.95	0.78
100.00	74.39	0.76
105.00	74.79	0.77
110.00	75.18	0.75
115.00	75.53	0.72
120.00	75.86	0.74
122.85	75.45	0.75
125.00	76.19	0.75
130.00	76.53	0.74
135.00	76.89	0.75
140.00	77.27	0.76
145.00	77.67	0.90
		0.75

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 0-150

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV — Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk C18_PS5-PS6

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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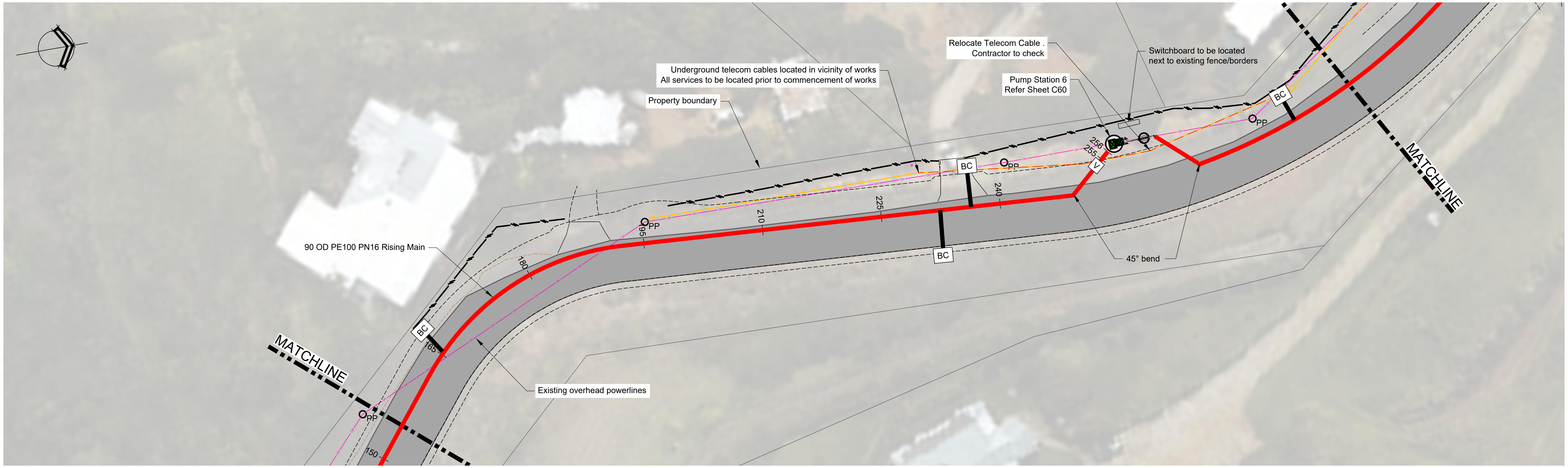
Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 5 to Pumpstation 6
Layout Plan and Longsection

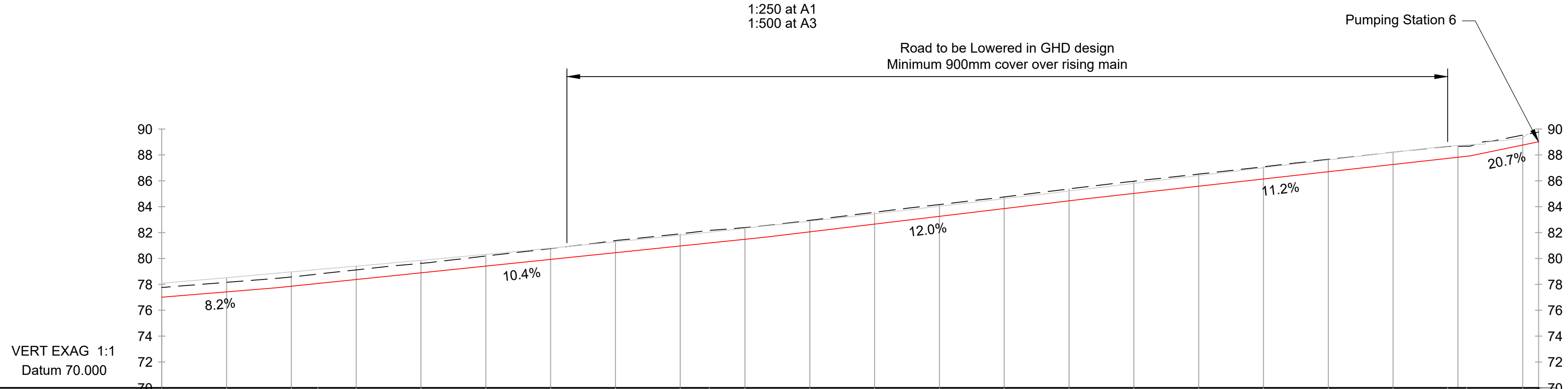
Scale (A1 Original) 1:250 m
Issue For Construction

Project No	Sheet	Revision
000770	C20	0



LAYOUT PLAN 150-256

1:250 at A1
1:500 at A3



STATION (m)	150.00	155.00	160.00	162.06	165.00	170.00	175.00	180.00	185.00	190.00	192.24	195.00	200.00
GROUND LEVEL (m) (Existing)	78.09	78.51	78.97	78.79	79.40	79.85	80.32	80.79	81.28	81.79	82.16	82.33	82.87
PIPE COVER (m)	0.75	0.73	0.72	0.73	0.74	0.73	0.78	0.84	0.93	0.94	0.96	0.90	0.89
PIPE TYPE	90OD PE100 HDPE PN16												

STATION (m)	205.00	210.00	215.00	220.00	225.00	230.00	235.00	240.00	245.00	249.21	250.00	255.00	256.22
GROUND LEVEL (m) (Existing)	83.44	84.04	84.62	85.21	85.80	86.40	87.01	87.61	88.20	88.65	88.73	89.32	
PIPE COVER (m)	0.91	0.91	0.90	0.92	0.94	0.93	0.94	0.96	0.94	0.92	0.84	0.76	0.75
PIPE TYPE													

LONGSECTION 150-256

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision	Description	Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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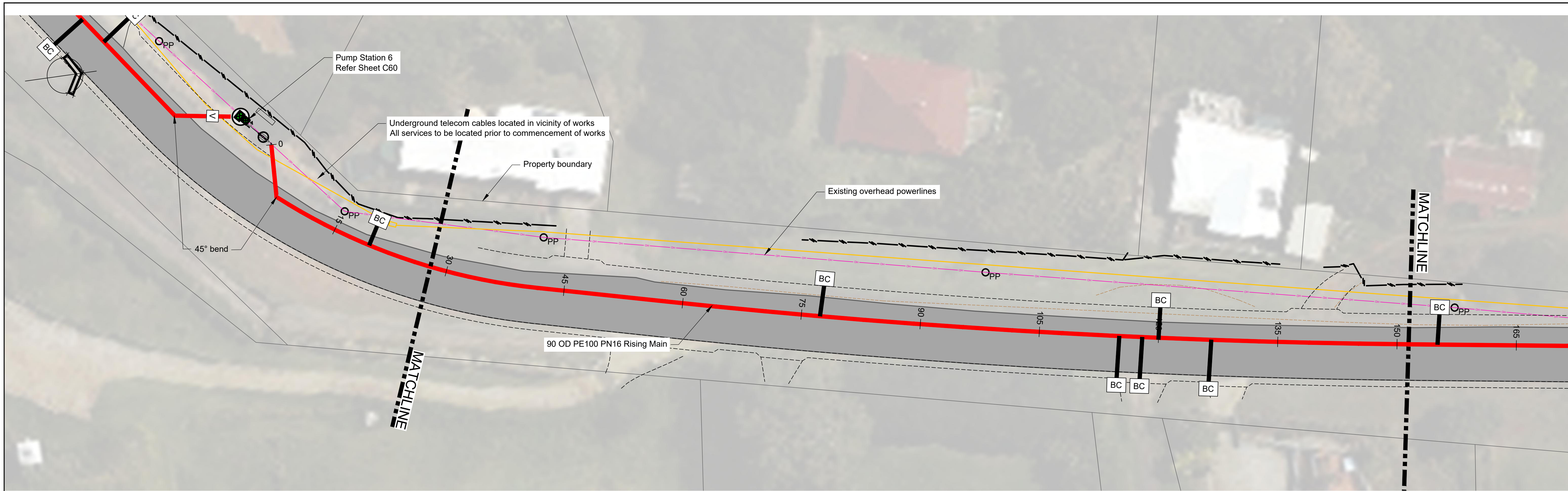
Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 5 to Pumpstation 6
Layout Plan and Longsection

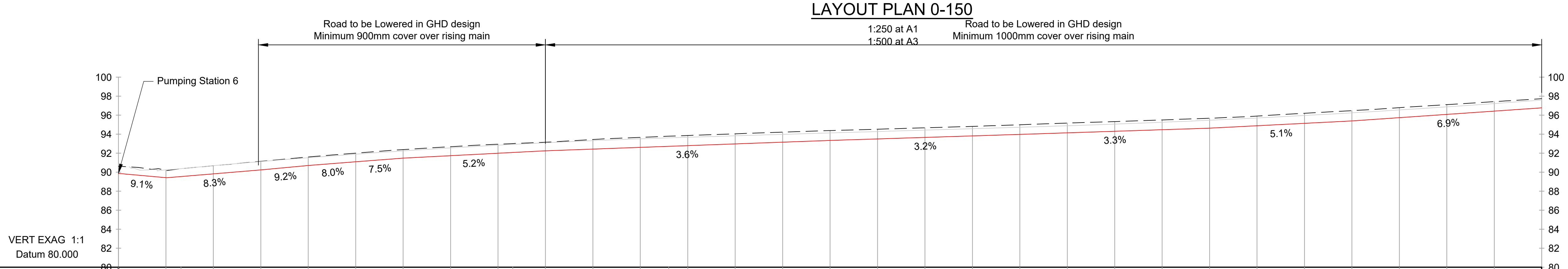
Scale (A1 Original) 1:250 m
Issue For Construction
Project No 000770 | Sheet C21 | Revision 0

0 10 20 30 40 50 mm 75 mm 100 mm



LAYOUT PLAN 0-150

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
0.00		0.75
5.00	90.24	0.76
6.59	90.38	0.83
10.00	90.68	0.85
15.00	91.12	0.90
20.00	91.52	0.90
25.00	91.90	0.90
30.00	92.24	0.90
35.00	92.55	0.94
40.00	92.84	0.95
41.56	93.01	0.93
45.00	93.09	0.90
50.00	93.32	1.01
55.00	93.51	1.05
57.99	93.78	1.06
60.00	93.68	1.06
65.00	93.83	1.06
70.00	93.98	1.05
75.00	94.13	1.04
80.00	94.28	1.02
85.00	94.43	1.01
90.00	94.58	1.00
95.00	94.73	1.01
100.00	94.89	1.02
105.00	95.06	1.02
110.00	95.26	1.03
115.00	95.47	1.04
120.00	95.71	1.02
125.00	95.97	1.05
130.00	96.25	1.07
135.00	96.55	1.04
140.00	96.88	1.02
145.00	97.22	0.99
		0.97

PIPE TYPE: 90OD PE100 HDPE PN16

LONGSECTION 0-150

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client: Australian Government, Department of Infrastructure, Transport, Regional Development and Communications

Project Title: Norfolk Island
KAVHA Wastewater Scheme

Sheet Title: Pumpstation 6 to Existing Manhole
Layout Plan and Longsection

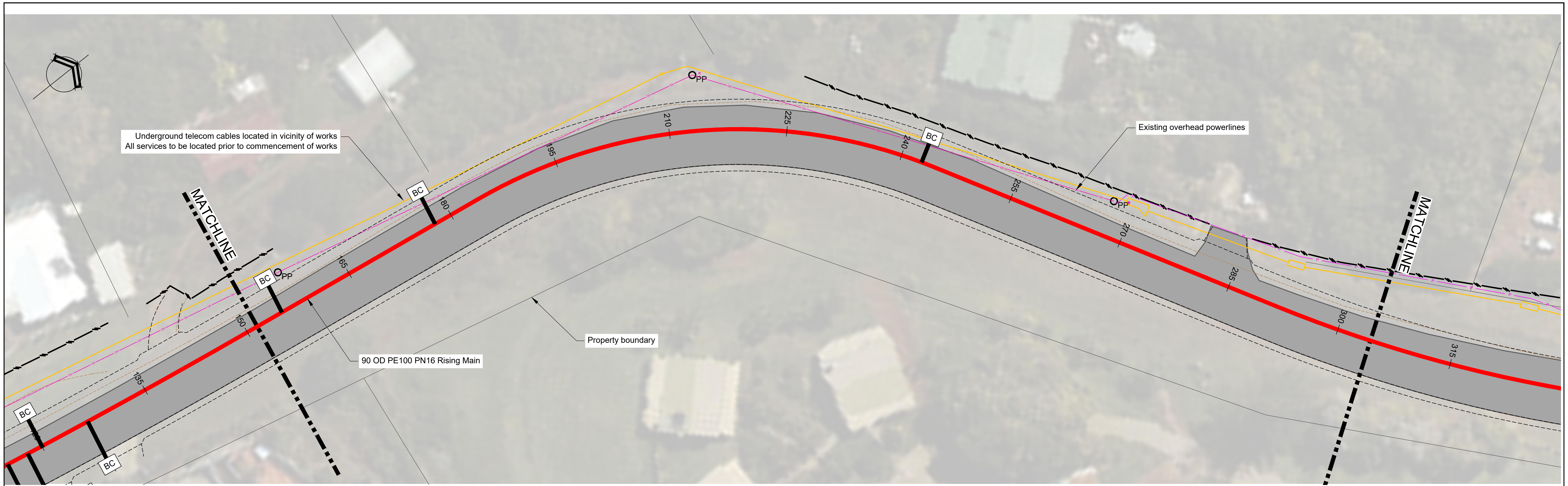
Scale (A1 Original): 1:250 m

Issue: For Construction

Project No	Sheet	Revision
000770	C22	0

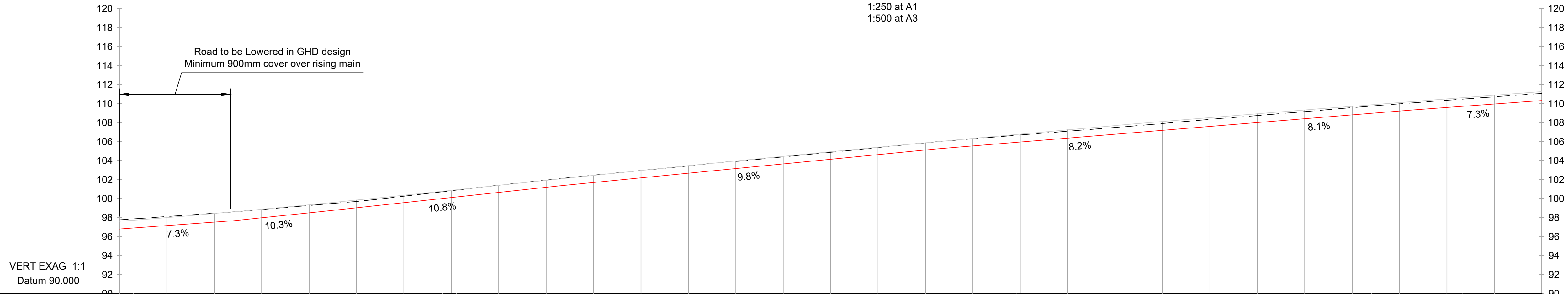
File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&36_Drawings\04_Production\000770 Norfolk C18_PS6-MH

100 mm 75 mm 50 mm 40 30 20 10 0



LAYOUT PLAN 150-300

1:250 at A1
1:500 at A3



STATION (m)	150.00	151.45	155.00	160.00	165.00	170.00	175.00	180.00	184.09	185.00	190.00	195.00	200.00	205.00	210.00	215.00	220.00	225.00
GROUND LEVEL (m) (Existing)	97.59	97.84	97.98	98.41	98.86	99.33	99.82	100.34	100.71	100.85	101.38	101.90	102.42	102.94	103.44	103.94	104.43	104.91
PIPE COVER (m)	0.97	0.96	0.95	0.93	0.87	0.78	0.67	0.68	0.71	0.72	0.75	0.75	0.76	0.77	0.77	0.76	0.74	0.73
PIPE TYPE	90OD PE100 HDPE PN16																	

STATION (m)	230.00	235.00	240.00	244.56	245.00	250.00	255.00	260.00	265.00	270.00	275.00	280.00	282.06	285.00	290.00	291.60	295.00	
GROUND LEVEL (m) (Existing)	105.39	105.85	106.31	106.64	106.77	107.22	107.67	108.09	108.50	108.91	109.31	109.69	109.73	110.09	110.48	110.45	110.87	
PIPE COVER (m)	0.75	0.75	0.75	0.74	0.74	0.73	0.71	0.72	0.74	0.73	0.75	0.76	0.77	0.76	0.76	0.76	0.76	0.75

LONGSECTION 150-300

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 6 to Existing Manhole
Layout Plan and Longsection

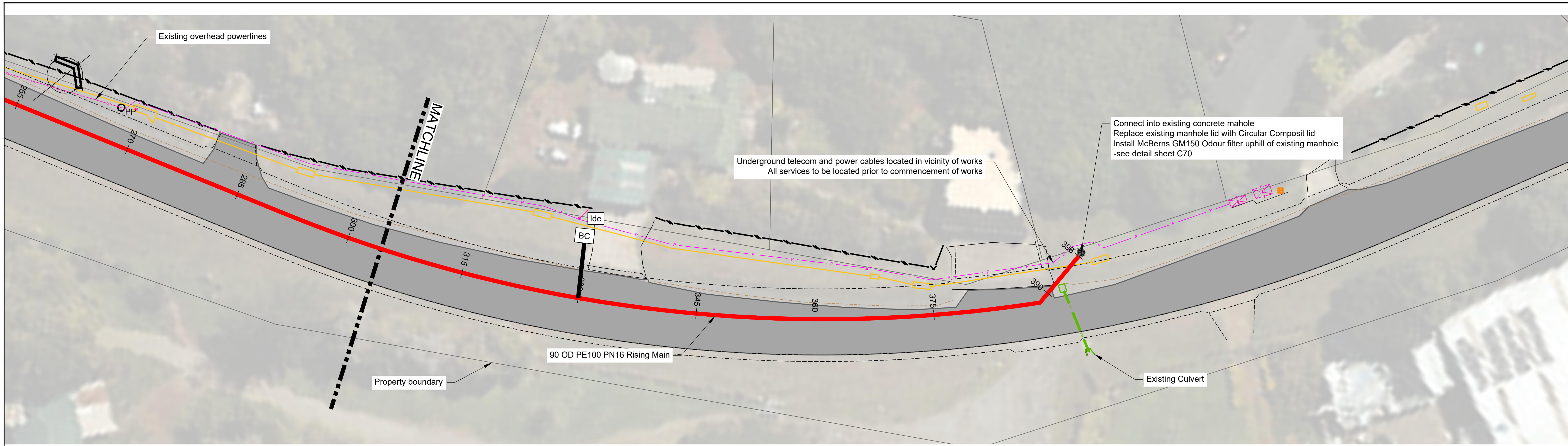
Scale (A1 Original) 1:250 m

Issue For Construction

Project No	Sheet	Revision
000770	C23	0

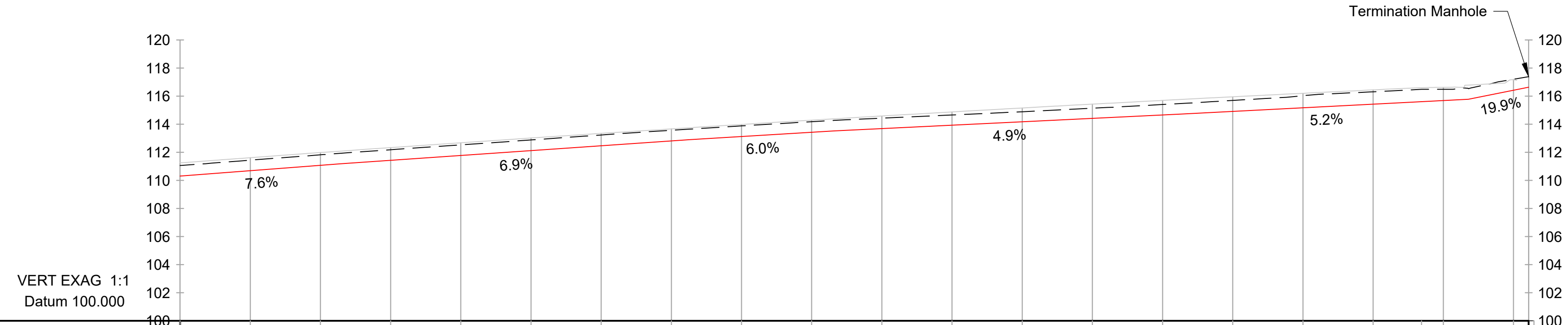
0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&36_Drawings\04_Production\000770 Norfolk C18_PS6-MH



LAYOUT PLAN 300-396

1:250 at A1
1:500 at A3



STATION (m)	300.00	305.00	310.00	315.00	320.00	325.00	330.00	335.00	340.00	345.00	350.00	355.00	360.00	365.00	370.00	375.00	380.00	385.00	388.45	390.00	395.00	396.08
GROUND LEVEL (m) (Existing)	111.24	111.61	111.98	112.33	112.67	113.01	113.34	113.67	113.98	114.28	114.58	114.87	115.15	115.43	115.69	115.95	116.20	116.44	116.48	116.63	117.16	
PIPE COVER (m)	0.75	0.75	0.75	0.76	0.76	0.76	0.77	0.76	0.75	0.76	0.74	0.73	0.72	0.72	0.74	0.78	0.86	0.88	0.88	0.79	0.78	0.75
PIPE TYPE	90OD PE100 HDPE PN16																					

LONGSECTION 300-396

1:250 at A1
1:500 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 6 to Existing Manhole
Layout Plan and Longsection

Scale (A1 Original) 1:250 m

Issue For Construction

Project No	Sheet	Revision
000770	C24	0

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk C18_PS6-MH

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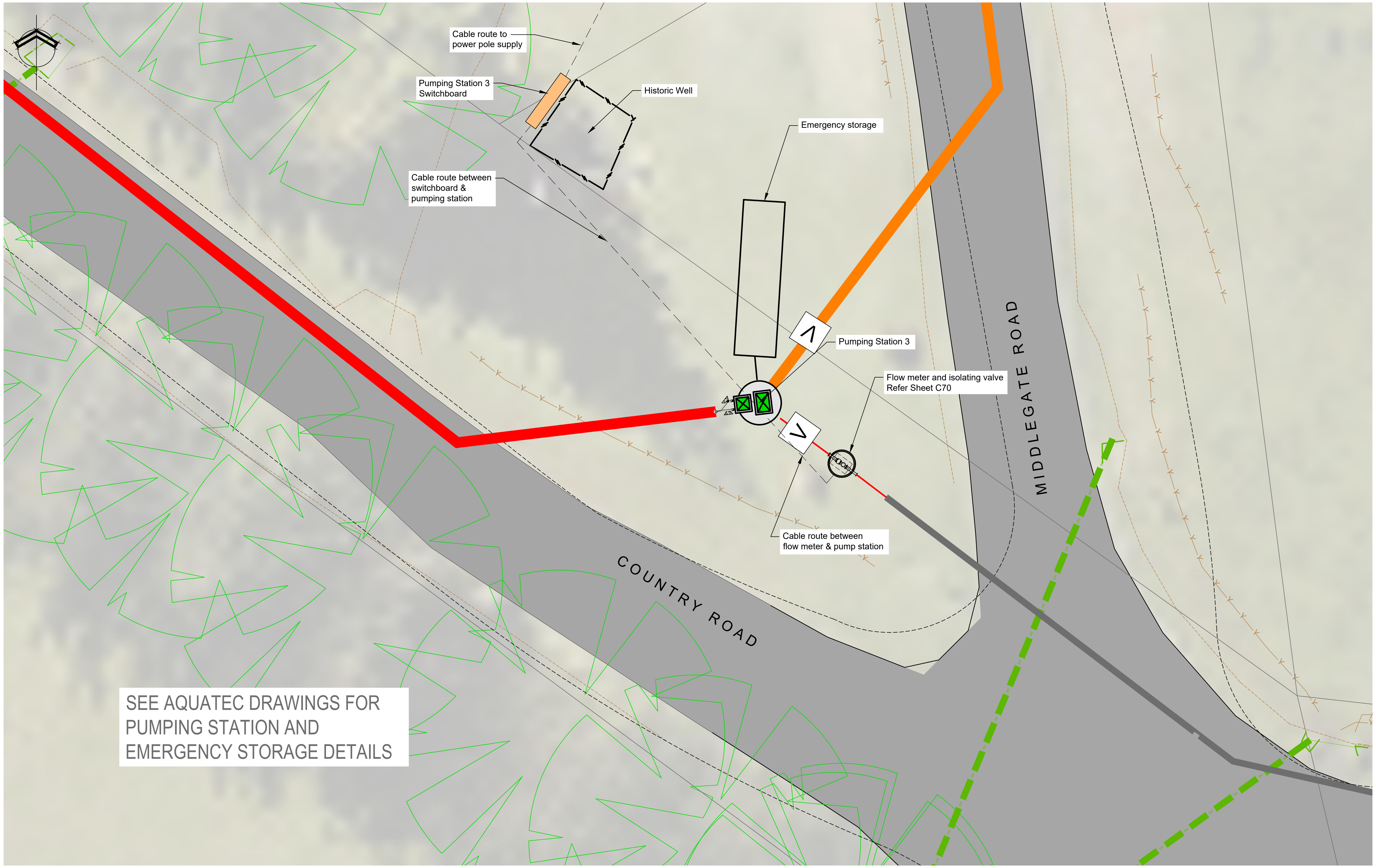

PUMP STATION LAYOUT PLAN

1:100 at A1
1:200 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Fluent SOLUTIONS
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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Pumpstation 3 Details

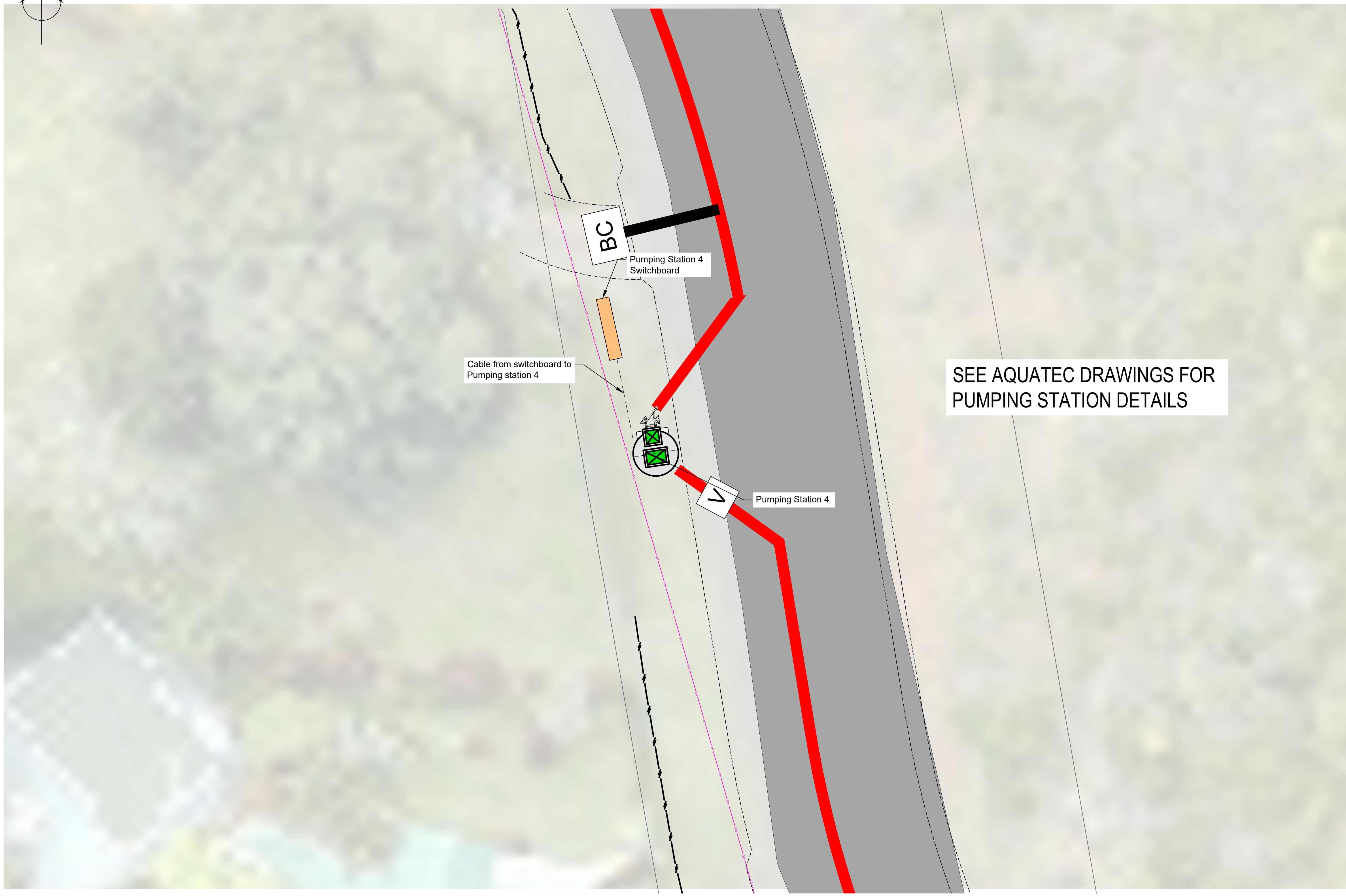
Scale (A1 Original) metres 1:100 m

Issue For Construction

Project No	Sheet	Revision
000770	C30	0

0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk_Stage 2A_PS



PUMP STATION LAYOUT PLAN

1:100 at A1
1:200 at A3

LEGEND

	Existing Telecom/Telecom Pits
	Existing stormwater (culvert / piped)
	Existing power (underground)
	Existing power (overhead)
	Existing property boundary
	Proposed foul sewer rising main
AV	Air Relief Valve
	GHD Road Alignment in plan
	GHD Road Alignment Surface
	Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\4_Production\000770 Norfolk_Stage 2A_PS

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

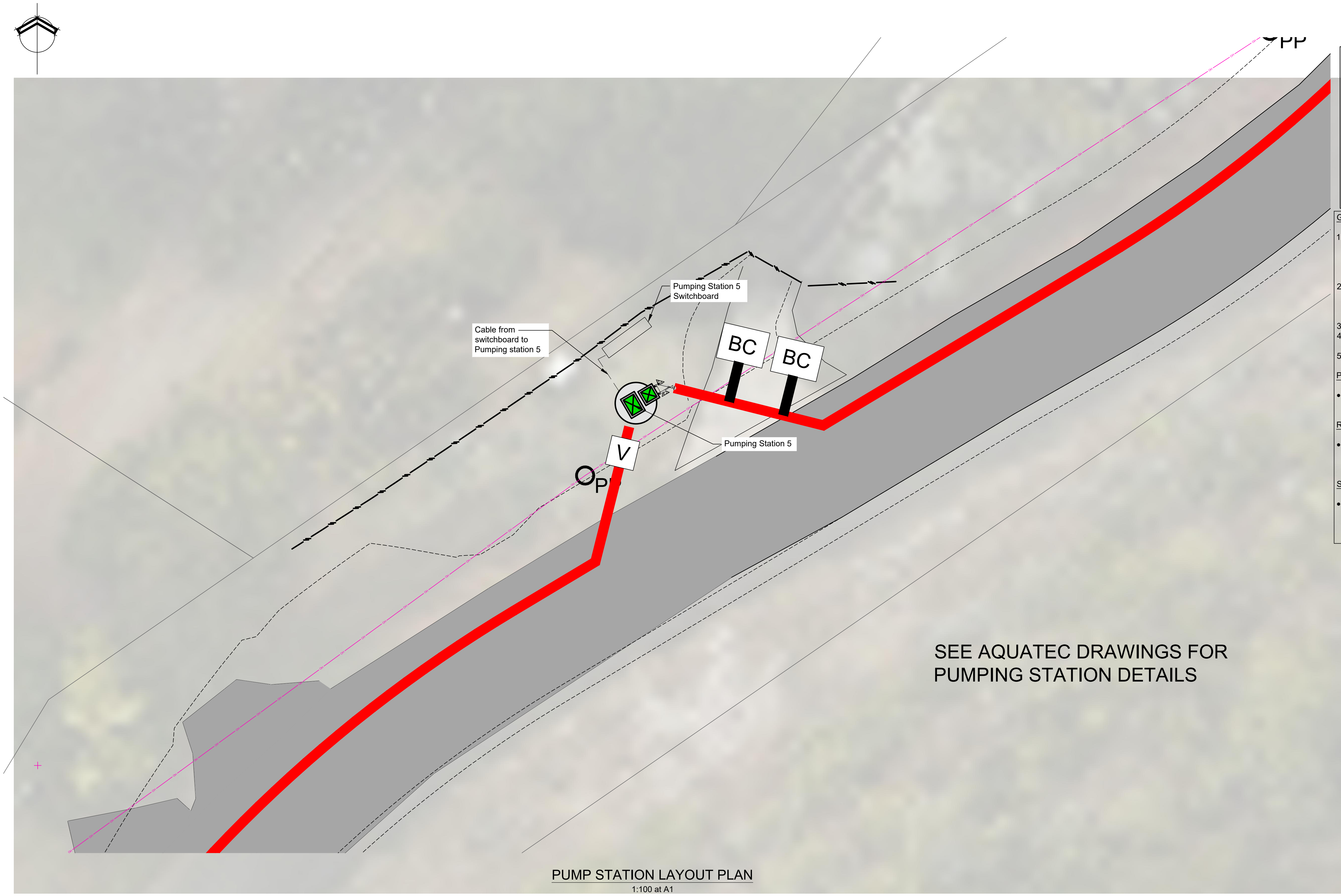
Sheet Title
Pumpstation 4 Details

Scale (A1 Original) metres 1:100 m

Issue For Construction

Project No	Sheet	Revision
000770	C40	0

0 10 20 30 40 50 mm 75 mm 100 mm



PUMP STATION LAYOUT PLAN

1:100 at A1
1:200 at A3

LEGEND

- Existing Telecom/Telecom Pits
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Proposed foul sewer rising main
- AV Air Relief Valve
- GHD Road Alignment in plan
- GHD Road Alignment Surface
- Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk_Stage 2A_PS

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
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Project Title
Norfolk Island
KAVHA Wastewater Scheme

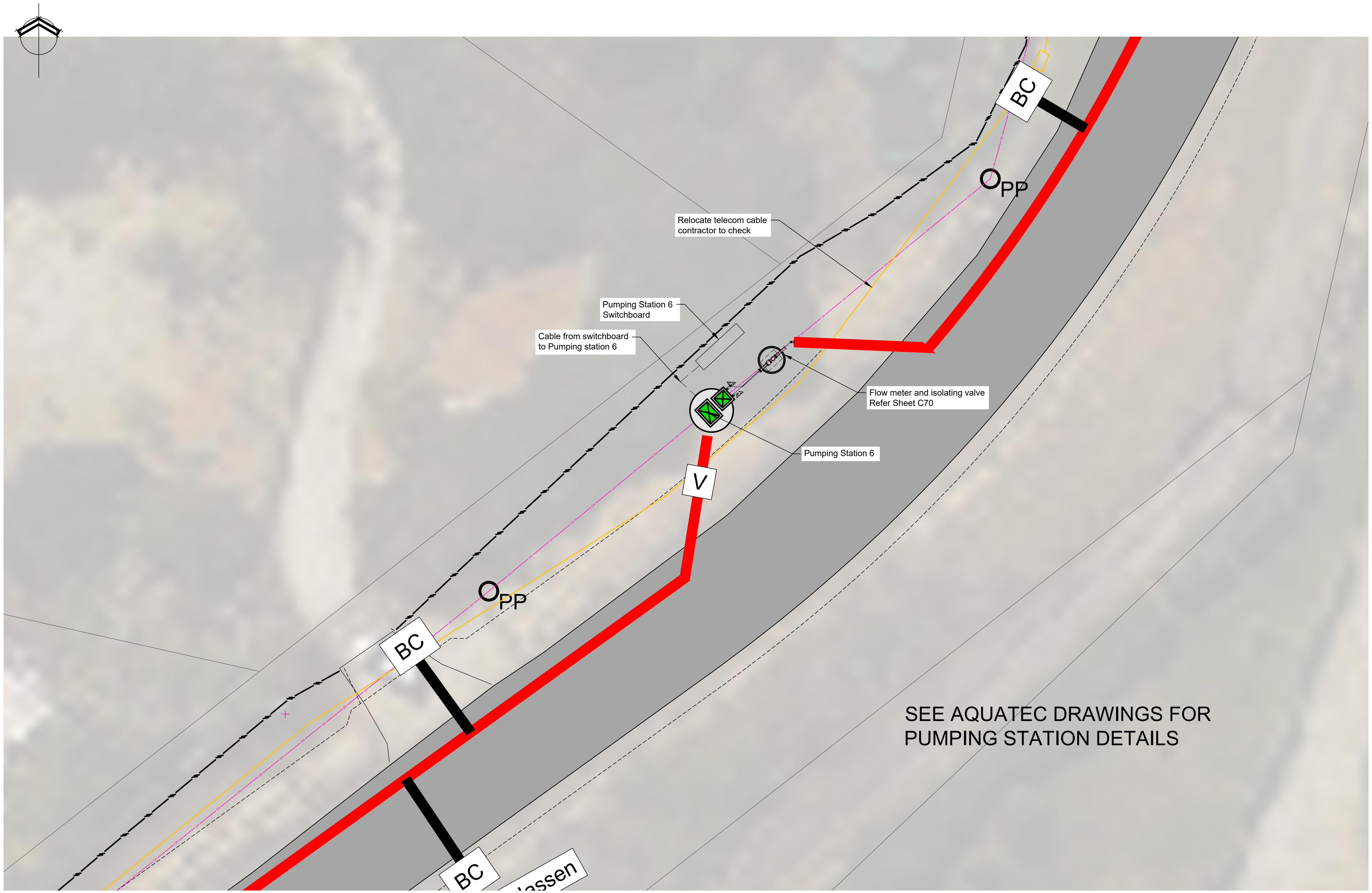
Sheet Title
Pumpstation 5 Details

Scale (A1 Original)
metres 1:100 m

Issue
For Construction

Project No	Sheet	Revision
000770	C50	0

0 10 20 30 40 50 mm 75 mm 100 mm



LEGEND
Existing Telecom/Telecom Pits
Existing stormwater (culvert / piped)
Existing power (underground)
Existing power (overhead)
Existing property boundary
Proposed foul sewer rising main
AV — Air Relief Valve
GHD Road Alignment in plan
GHD Road Alignment Surface
Existing Ground Surface

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. New underground power supply to pump stations to be taken from new pole mounted transformers as required - confirm location of power route on site.
3. All trench work to be reinstated as per existing.
4. Sections of shallow pipe to be concrete capped. Refer detail sheet C70.
5. 90OD PE100 Minimum Bend Radius = 2.0m.

PUMP STATION NOTES

- Pumpstation design to be as per supplied Aquatec drawings.

RISING MAIN NOTES

- When crossing above of below existing culverts, allow 150mm clearance between the rising main and the existing culvert.

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

PUMP STATION LAYOUT PLAN

1:100 at A1
1:200 at A3

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Verify all dimensions on site before commencing work. Prioritise figured dimensions over scaling. Refer all discrepancies to the drawing office.

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Client
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Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

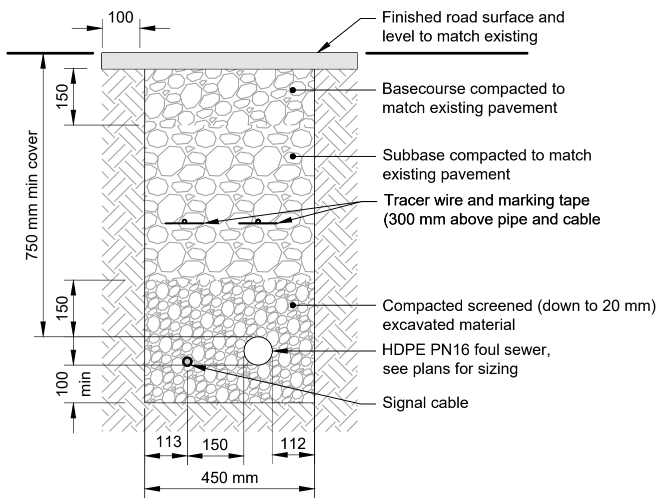
Sheet Title
Pumpstation 6 Details

Scale (A1 Original) — metres 1:100 m
Issue — For Construction

Project No	Sheet	Revision
000770	C60	0

0 10 20 30 40 50 mm 75 mm 100 mm

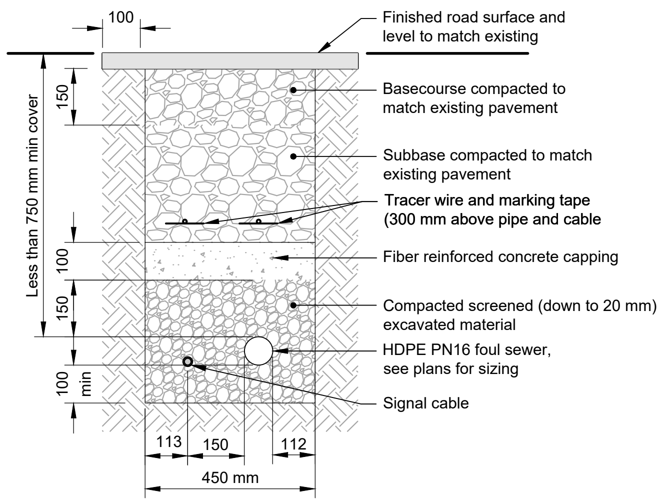
File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&36_Drawings\04_Production\000770 Norfolk_Stage 2A_PS



TRAFFICABLE (SEALED ROADS)

TYPICAL TRENCH DETAIL

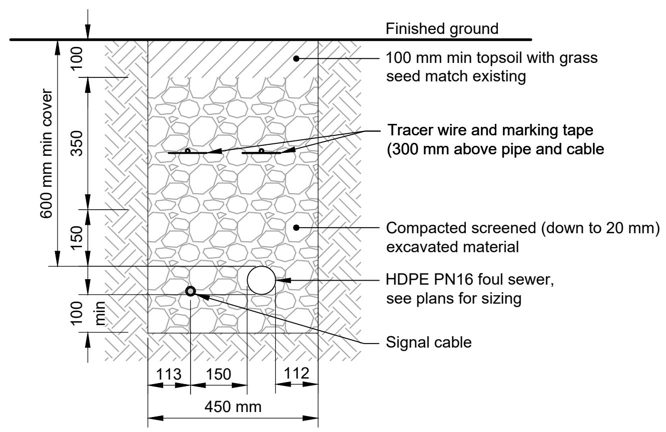
1:10 at A1
1:20 at A3



TRAFFICABLE (SEALED ROADS) - COVER LESS THAN 750MM

TYPICAL TRENCH DETAIL

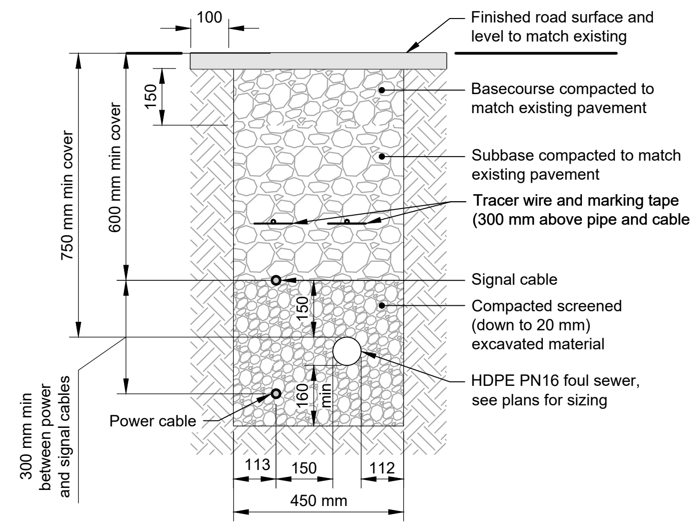
1:10 at A1
1:20 at A3



NON-TRAFFICABLE

TYPICAL TRENCH DETAIL

1:10 at A1
1:20 at A3



TRAFFICABLE (SEALED ROADS)

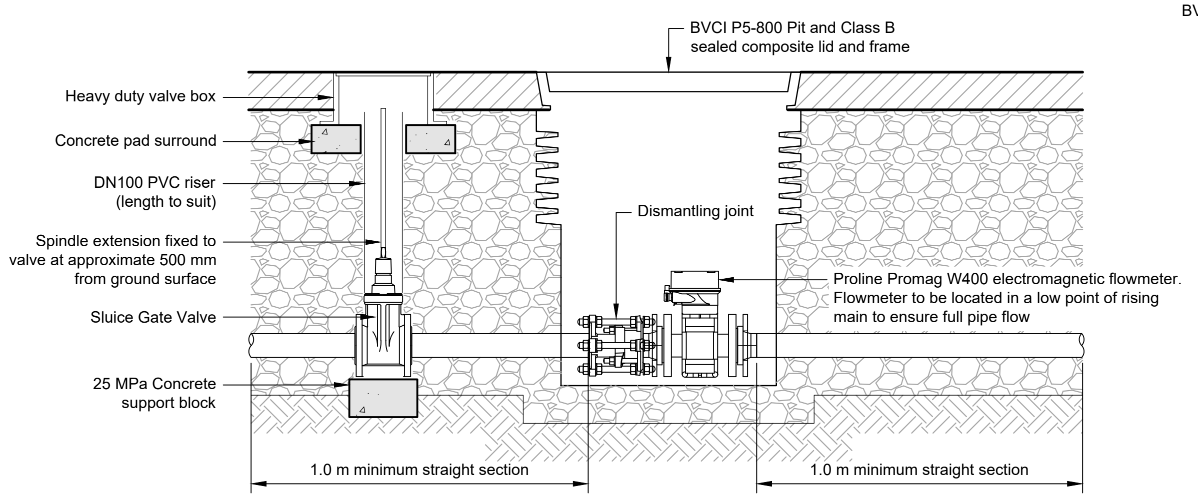
TYPICAL TRENCH DETAIL
COMBINED POWER AND SIGNAL CABLES

1:10 at A1
1:20 at A3

NOTES:

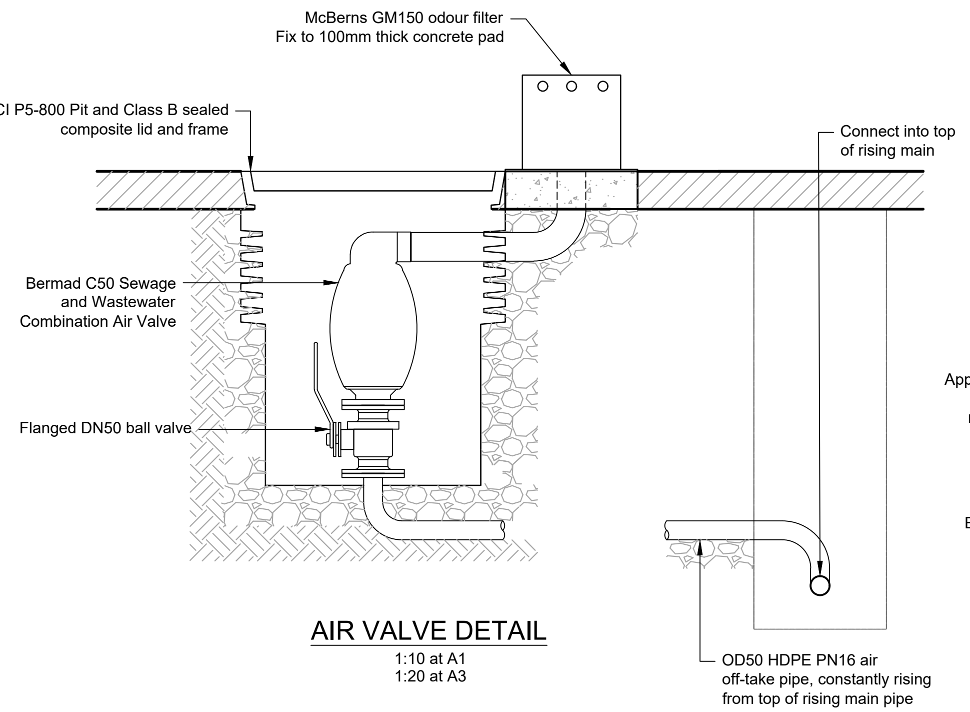
D = External Diameter of Pipe

Trench to be Reinstated to Match Existing Levels



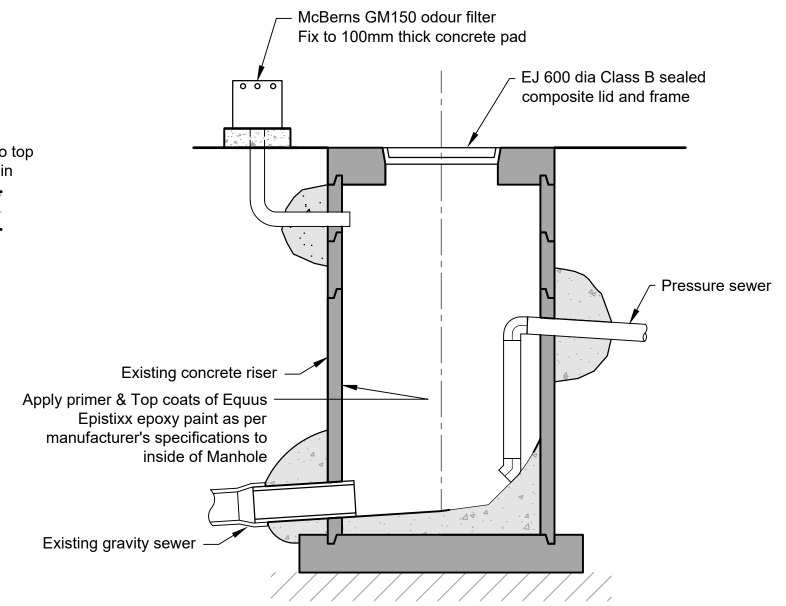
FLOW METER DETAIL

1:10 at A1
1:20 at A3



AIR VALVE DETAIL

1:10 at A1
1:20 at A3



MANHOLE DETAIL

1:20 at A1
1:40 at A3

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
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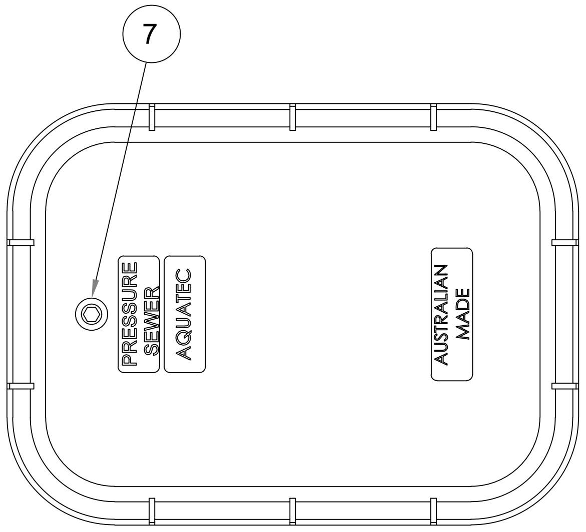
Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Typical Details
1 of 3

Scale (A1 Original) As Shown
Issue For Construction

Project No	Sheet	Revision
000770	C70	0

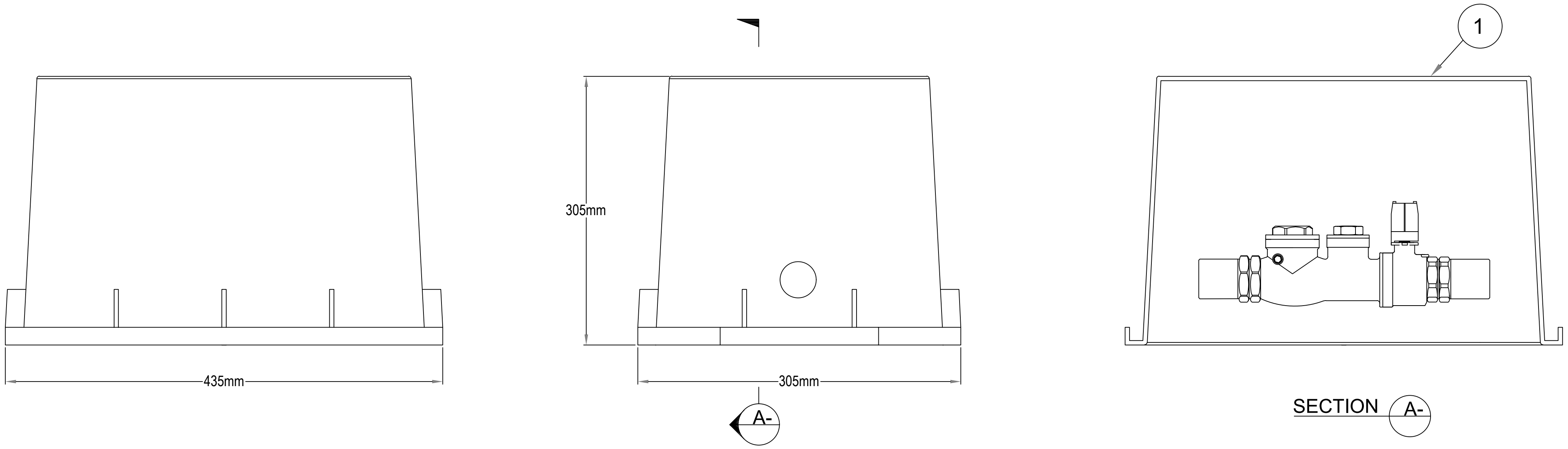
File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\Details\Pro... Norfolk_Stage 2 Details



NOTES:

1	POLYETHYLENE ONE PIECE PIT WITH COVER, CLASS A
2	GR316 S/S BALL VALVE, FULL BORE
3	GR316 S/S PUMP OUT TEE
4	GR316 S/S PLUG
5	GR316 S/S SWING CHECK VALVE, FULL BORE
6	PE MALE THREAD ADAPTER
7	GR316 S/S BOLT

NOTE:
- FITTINGS 2 to 5 IS A ONE PIECE ASSEMBLY
- ITEM 6 ALSO AVAILABLE IN BRASS AND 316 S/S



AQUATEC BOUNDARY CONNECTION KIT
NTS

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\Details\Pro__Norfolk_Stage 2 Details

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
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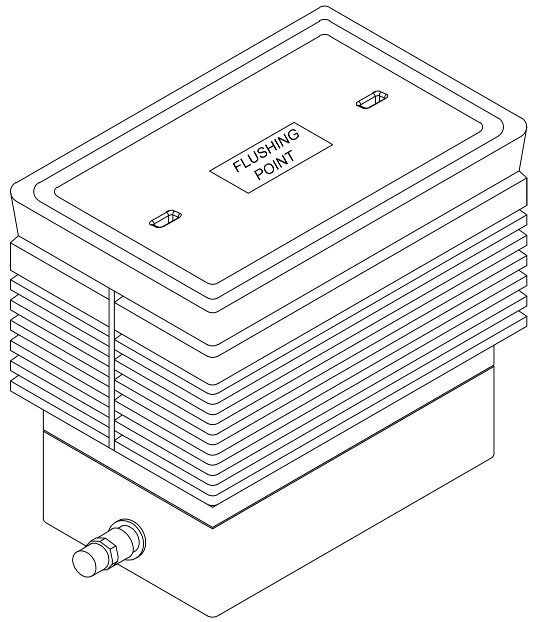
Project Title
Norfolk Island
KAVHA Wastewater Scheme

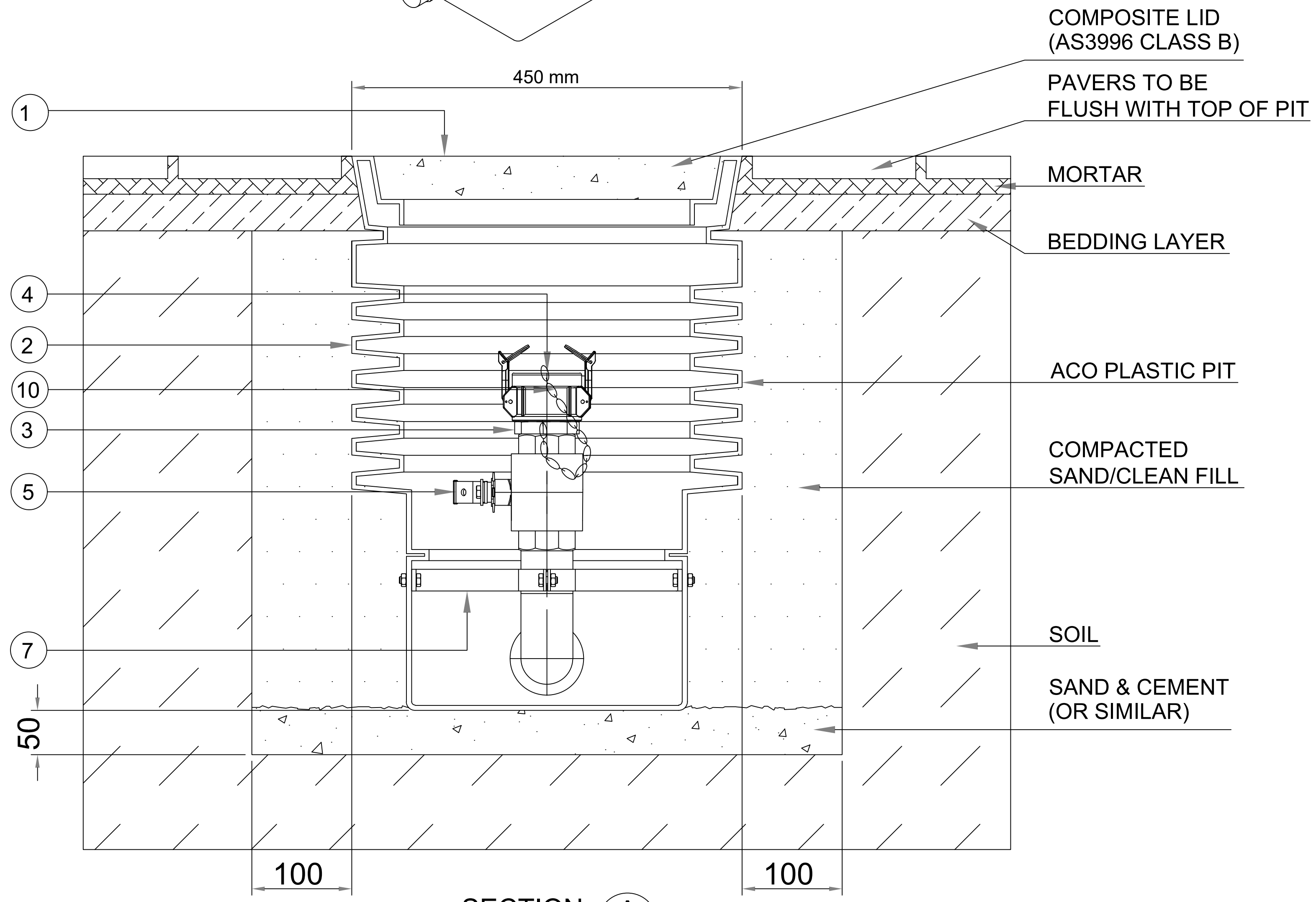
Sheet Title
Typical Details
2 of 3

Scale (A1 Original) As Shown
Issue For Construction
Project No 000770
Sheet C71
Revision 0

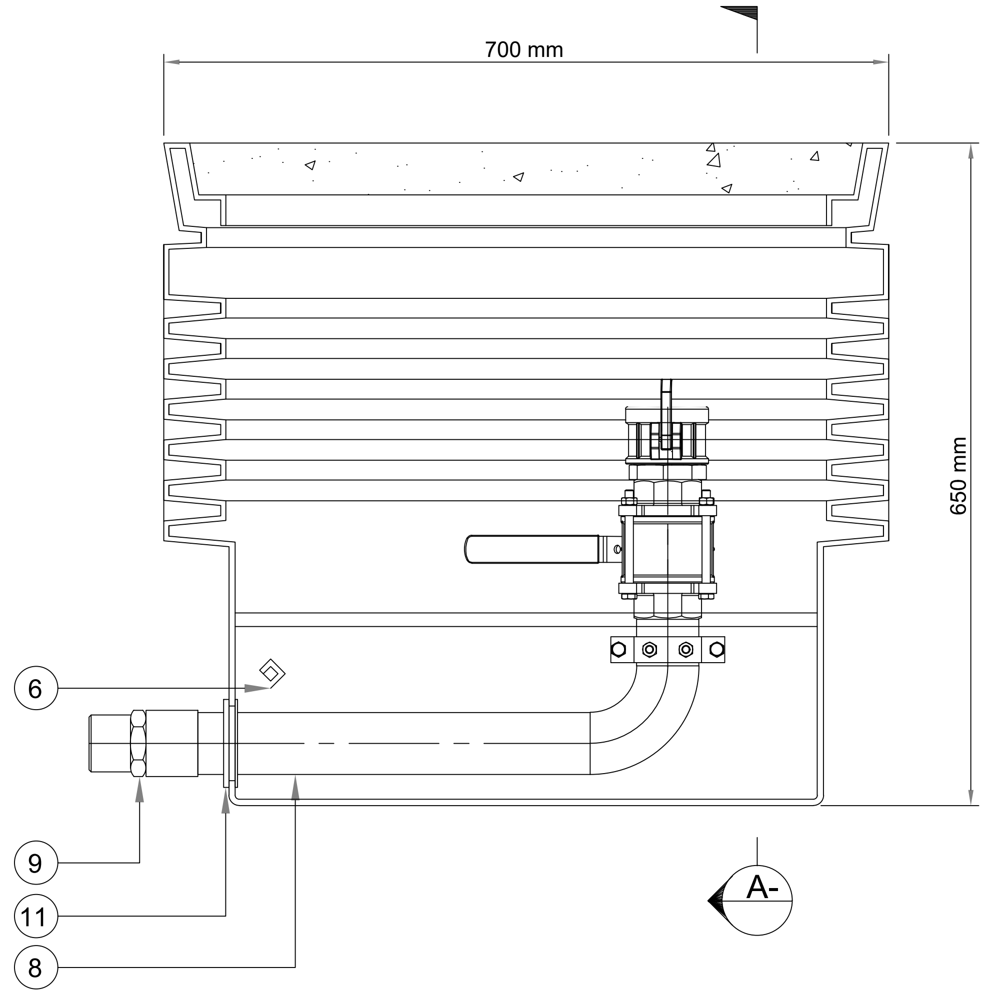
0 10 20 30 40 50 mm 75 mm 100 mm



NOTES:	
1	COMPOSITE 'CLASS B' COVER TO SUIT (AS3996)
2	POLYETHYLENE PIT
3	POLYETHYLENE MALE CAMLOCK
4	POLYETHYLENE FEMALE CAMLOCK DUST CAP
5	GR316 S/S BALL VALVE, FULL BORE, LOCKABLE EYELET
6	GR 316 S/S TRACER WIRE (BY OTHERS)
7	GR316 S/S PIPE SUPPORT BRACKET
8	GR316 S/S PIPEWORK
9	POLYETHYLENE TRANSITION COUPLER (CONNECTION BY CIVIL CONTRACTOR)
10	GR316 S/S CHAIN
11	RUBBER UNISEAL
12	FITTINGS & MATERIALS TO BE IN ACCORDANCE WITH AUSTRALIAN STANDARDS



SECTION A-



AQUATEC FLUSHING POINT

NTS

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

Verify all dimensions on site before commencing work. Prioritise figured dimensions over scaling. Refer all discrepancies to the drawing office.

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Client

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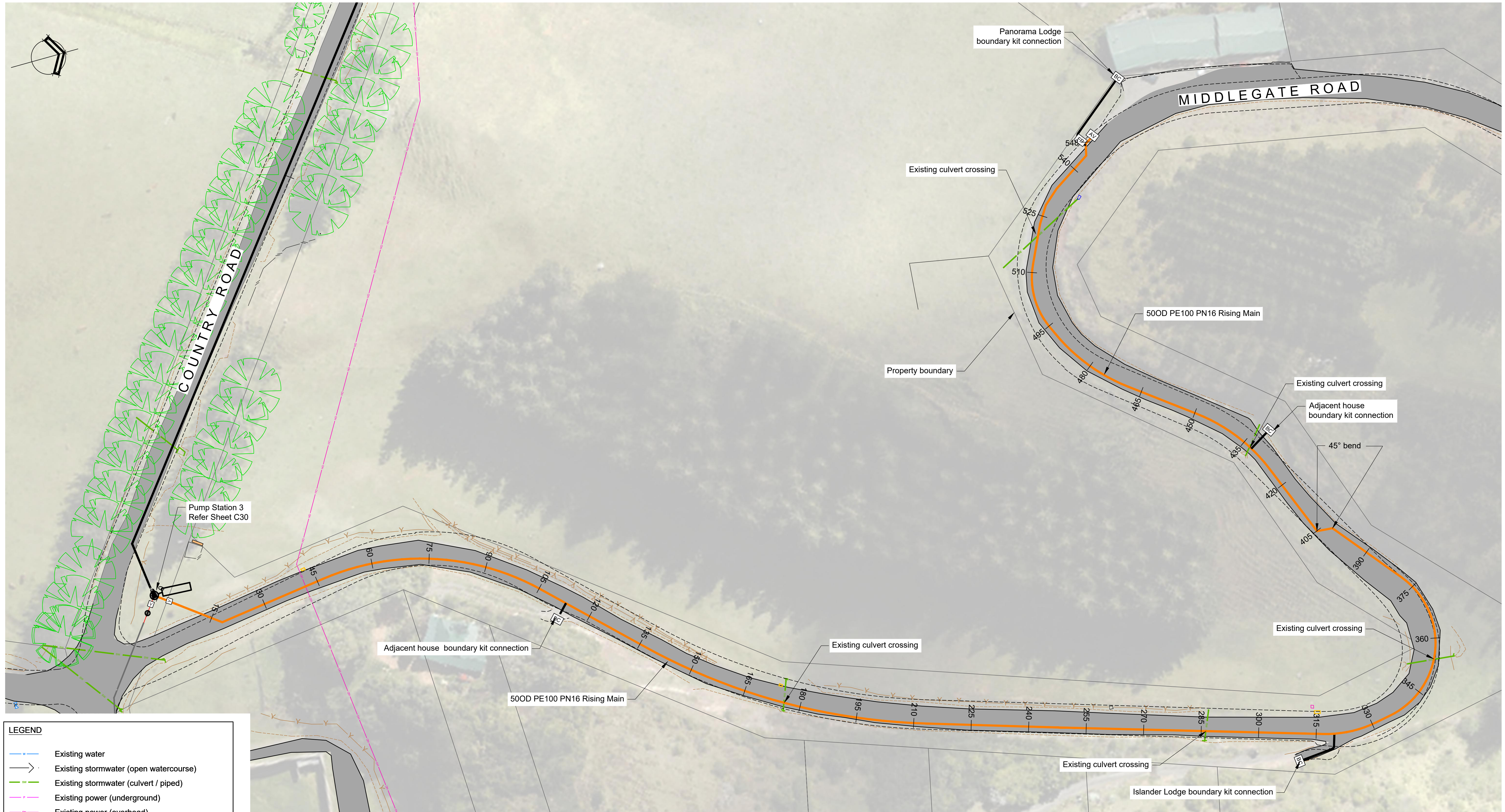
Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Typical details
3 of 3

Scale (A1 Original) As Shown

Issue For Construction

Project No	Sheet	Revision
000770	C72	0



LEGEND

	Existing water
	Existing stormwater (open watercourse)
	Existing stormwater (culvert / piped)
	Existing power (underground)
	Existing power (overhead)
	Existing property boundary
FP	Flushing Point Kit
V	Isolation Valve Kit
AV	Air Relief Valve Kit
BC	Boundary Connection Kit
	Proposed Rising Main PN16 40 mm OD PE100
	Proposed Rising Main PN16 50 mm OD PE100
	Proposed Rising Main PN16 63 mm OD PE100
	GHD Road Alignment

LAYOUT PLAN

1:250 at A1
1:500 at A3

Revision		Des	Drn	Rvd	App	Date
0	For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
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Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 2B - Middlegate Road
Layout Plan

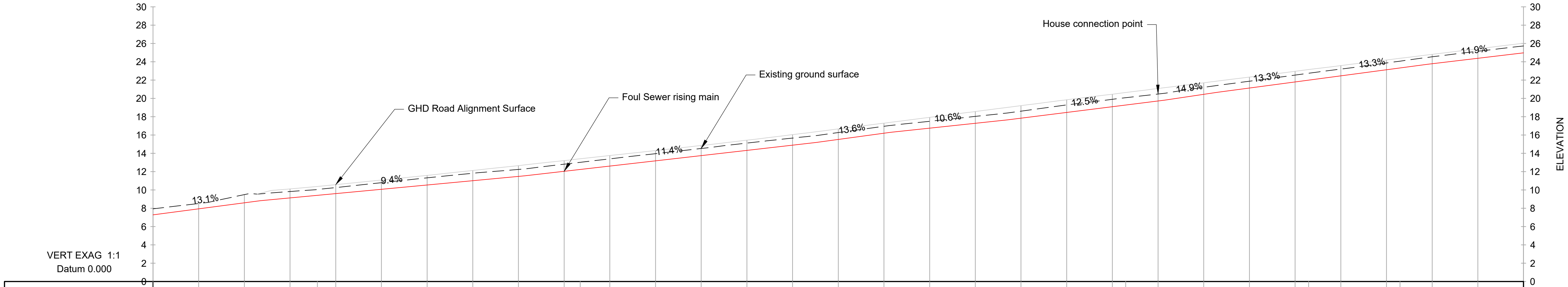
Scale (A1 Original) 1:500 m

Issue For Construction

Project No	Sheet	Revision
000770	C80	0

100 mm 75 mm 50 mm 40 30 20 10 0

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk_Stage 2B

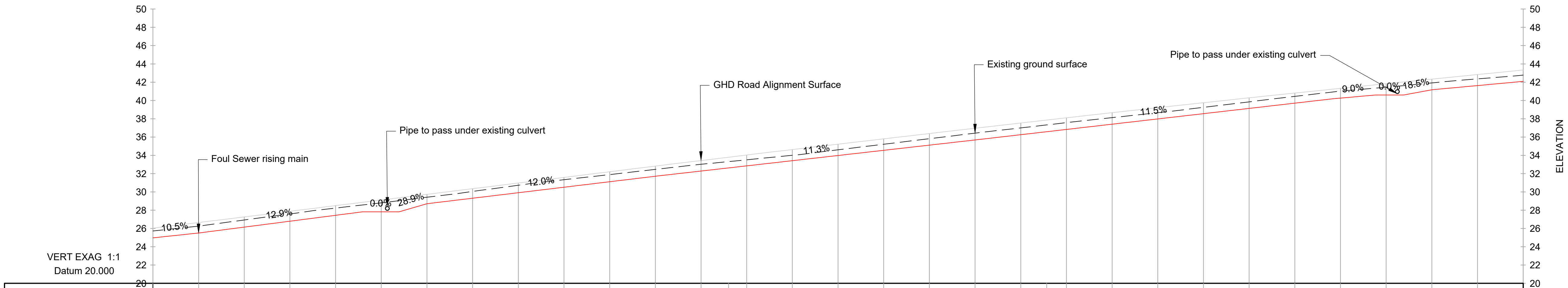


STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
0.00		
5.00	8.52	0.58
10.00	9.49	0.90
15.00	9.82	0.70
18.00	10.04	0.64
20.00	10.26	0.66
25.00	10.79	0.73
30.00	11.32	0.79
35.00	11.82	0.82
40.00	12.24	0.76
45.00	12.81	0.78
46.76	13.02	0.78
50.00	13.39	0.79
55.00	13.96	0.79
60.00	14.53	0.78
65.00	15.12	0.80
70.00	15.66	0.77
75.00	16.27	0.75
80.00	16.95	0.75
85.00	17.50	0.75
90.00	18.03	0.75
95.00	18.60	0.76
100.00	19.29	0.82
105.00	19.90	0.81
105.47	19.96	0.81
110.00	20.47	0.76
115.00	21.20	0.76
120.00	21.87	0.74
125.00	22.55	0.75
126.48	22.74	0.75
130.00	23.20	0.73
135.00	23.87	0.74
136.48	24.07	0.74
140.00	24.54	0.75
145.00	25.14	0.77
		0.75

PIPE TYPE: 50OD PE100 HDPE PN16

LONGSECTION 0-150

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
150.00	25.72	0.75
155.00	26.25	0.75
160.00	26.92	0.78
165.00	27.59	0.80
170.00	28.23	0.79
175.00	28.80	0.99
180.00	29.41	0.71
185.00	30.05	0.75
190.00	30.72	0.82
195.00	31.33	0.83
200.00	31.89	0.78
205.00	32.46	0.75
210.00	33.02	0.75
213.01	33.31	0.69
215.00	33.51	0.67
220.00	34.00	0.59
225.00	34.60	0.63
230.00	35.21	0.67
235.00	35.82	0.71
240.00	36.42	0.75
245.00	37.00	0.75
247.84	37.32	0.75
250.00	37.58	0.75
255.00	38.12	0.72
260.00	38.66	0.68
265.00	39.25	0.69
270.00	39.85	0.72
275.00	40.45	0.75
280.00	41.02	0.76
285.00	41.45	0.85
290.00	41.92	0.75
295.00	42.36	0.73
		0.69

PIPE TYPE: 50OD PE100 HDPE PN16

LONGSECTION 150-300

1:250 at A1
1:500 at A3

Revision	Des	Drn	Rvd	App	Date
0 For Construction	ACS	ESG	ACS	ACS	29/11/23

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Department of Infrastructure, Transport, Regional Development and Communications

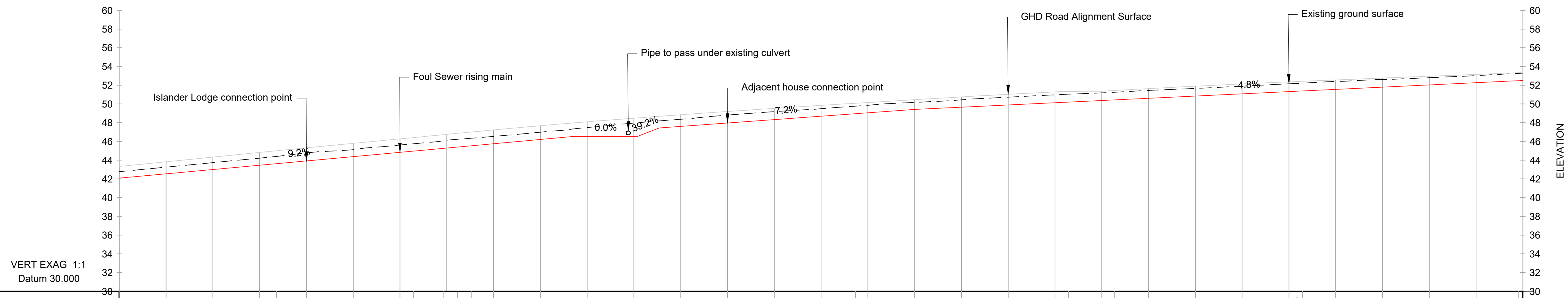
Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 2B - Middlegate Road
Longsections
1 of 2

Scale (A1 Original) 1:250 m
Issue: For Construction
Project No: 000770
Sheet: C81
Revision: 0

0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2B&36_Drawings\04_Production\000770 Norfolk_Stage 2B_LS

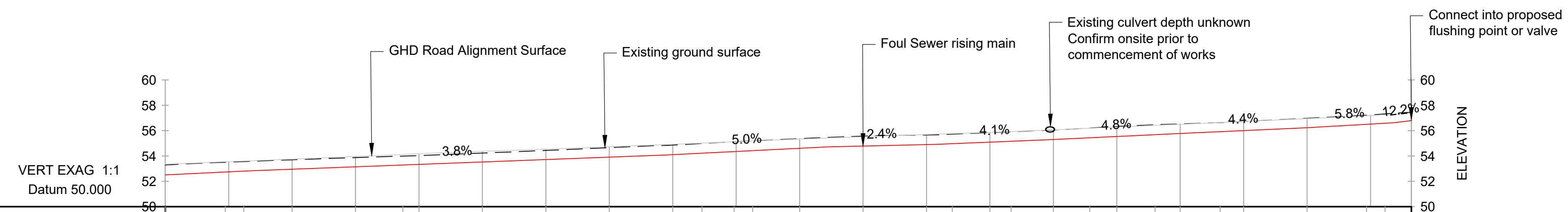


STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
300.00		0.69
305.00	43.26	0.71
310.00	43.74	0.74
315.00	44.22	0.76
316.82	43.63	0.77
320.00	44.78	0.86
325.00	45.12	0.74
330.00	45.62	0.78
330.97	44.93	0.78
334.69	45.27	0.82
335.00	46.13	0.84
335.17	45.31	0.84
340.00	46.54	0.79
345.00	46.99	0.78
350.00	47.49	0.94
355.00	47.97	1.42
360.00	48.37	0.76
365.00	48.82	0.84
370.00	49.19	0.85
375.00	49.50	0.80
378.70	48.97	0.81
380.00	49.86	0.80
385.00		0.75
390.00	50.45	0.79
395.00	50.73	0.83
400.00	50.98	0.85
400.83	50.17	0.85
404.93	50.37	0.82
405.00	51.19	0.82
410.00	51.46	0.85
415.00	51.66	0.81
420.00	51.91	0.82
425.00	52.16	0.83
425.39	51.34	0.83
430.00	52.41	0.84
435.00	52.62	0.82
440.00	52.81	0.77
445.00	53.04	0.76
449.51	52.49	0.78
		0.78

PIPE TYPE: 63OD HDPE PN16 (300.00–320.00); 50OD PE100 HDPE PN16 (320.00–449.51)

LONGSECTION 300-450

1:250 at A1
1:500 at A3



STATION (m)	GROUND LEVEL (m) (Existing)	PIPE COVER (m)
450.00	53.29	0.78
454.73	53.51	0.77
455.00	53.52	0.77
460.00	53.70	0.74
465.00	53.87	0.73
468.73	53.99	0.70
470.00	54.03	0.69
475.00	54.23	0.70
480.00	54.44	0.72
485.00	54.66	0.75
490.00	54.86	0.75
492.31	54.99	0.77
494.84	55.12	0.78
495.00	55.13	0.78
500.00	55.37	0.76
505.00	55.56	0.78
510.00	55.65	0.75
512.04	55.72	0.75
515.00	55.84	0.75
516.67	55.91	0.75
520.00	56.05	0.75
522.88	56.20	0.77
525.00	56.33	0.79
528.01	56.47	0.78
530.00	56.53	0.75
533.15	56.64	0.71
535.00	56.73	0.72
540.00	56.98	0.75
544.68	57.21	0.71
545.00	57.24	0.72

PIPE TYPE: 50OD PE100 HDPE PN16

LONGSECTION 450-548

1:250 at A1
1:500 at A3

Revision	Des	Drn	Rvd	App	Date
0 For Construction	ACS	ESG	ACS	ACS	29/11/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 2B - Middlegate Road
Longsections
2 of 2

Scale (A1 Original) 1:250 m
Issue For Construction

Project No	Sheet	Revision
000770	C82	0

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\000770 Norfolk_Stage 2B_LS

0 10 20 30 40 50 mm 75 mm 100 mm

NORFOLK ISLAND KAVHA WASTEWATER SCHEME

STAGE 3

CIVIL ENGINEERING DRAWINGS

Project No. 000770

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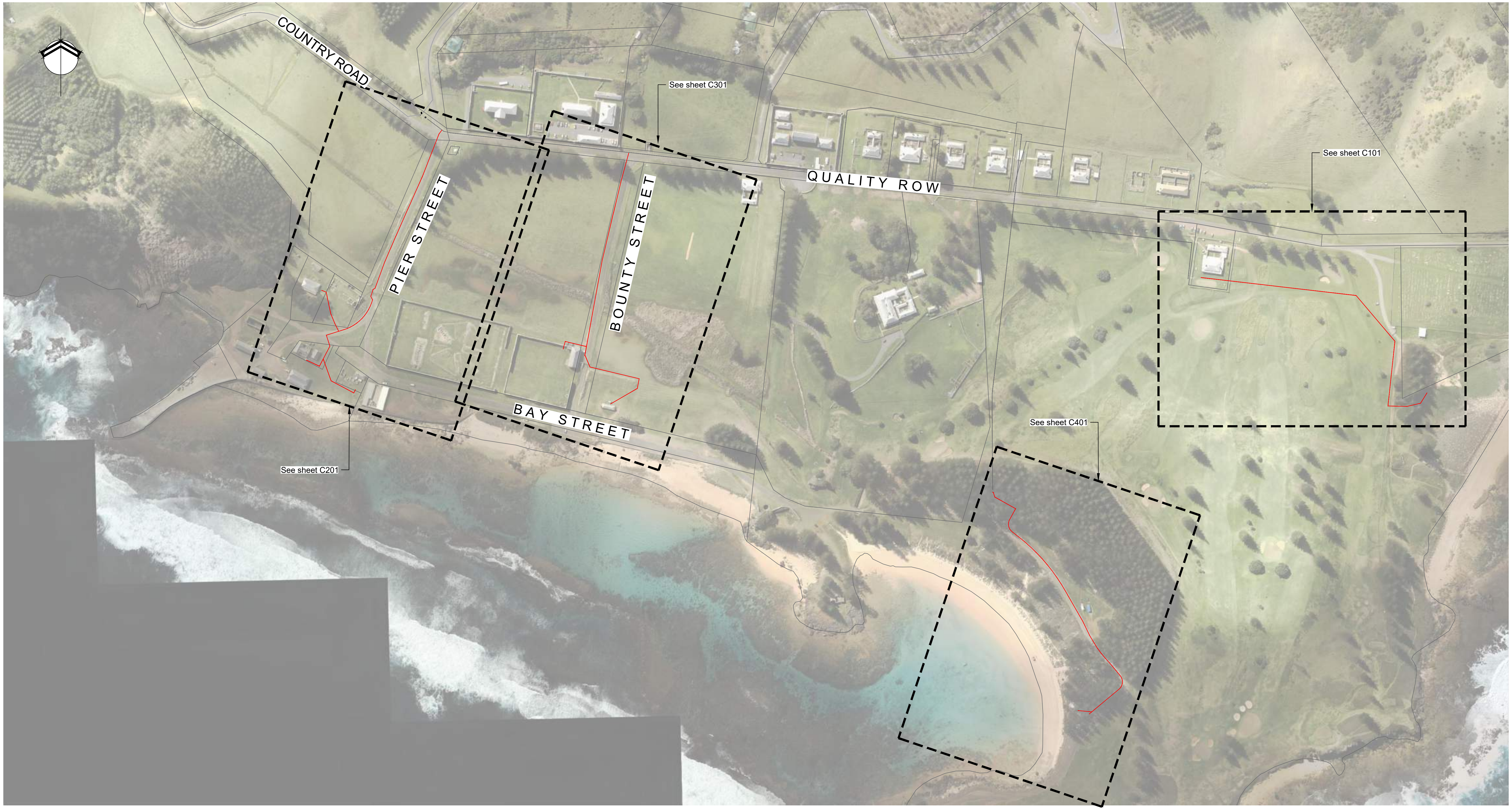
Sheet List Table

Sheet Number	Sheet Title	Rev
C001	General Arrangement	A
Cemetery Bay		
C101	Layout Plan	B
C102	Longsections	B
Pier Precinct		
C201	Layout Plan	B
C202	Longsections	B
Bounty Street		
C301	Layout Plan	B
C302		
Lone Pine		
C401	Layout Plan	B
C402	Longsections	B
Details		
C501	Typical Details	B
C502	Typical Details	B
C503	Typical Details	A

ISSUED FOR DETAILED DESIGN

19/10/2023



GENERAL ARRANGEMENT

1:2,000 at A1
1:4,000 at A3

Revision		Des	Drn	Rvd	App	Date
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

Verify all dimensions on site before commencing work. Prioritise figured dimensions over scaling. Refer all discrepancies to the drawing office.

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 3
General Arrangement

Scale (A1 Original) 1:2000 m

Issue For Detailed Design

Project No	Sheet	Revision
000770	C001	A

0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\Stage 3\PRO_Norfolk_Stage 3_General Arrangement_C01

LAYOUT PLAN

1:500 at A1
1:1000 at A3

LEGEND

- Existing water
- Existing stormwater (open watercourse)
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Existing septic tanks to be decommissioned (see General Notes)
- Proposed pump station (see Pump Station Notes)
- FP Flushing Point Kit (see Note 5)
- V Isolation Valve Kit (see Note 5)
- BC Boundary Connection Kit (see Note 5)
- Proposed Rising Main PN16 40 mm OD PE100
- Proposed Rising Main PN16 50 mm OD PE100
- Proposed Rising Main PN16 63 mm OD PE100

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. Existing septic tanks to be decommissioned where shown. Upon completion of new pump stations and foul sewer system, drain, disinfect, cut hole in base, cut roof of tank, collapse in and fill existing septic tank.
3. New underground power supply to pump stations to be taken from property building - confirm location of power route on site.
4. All trench work to be reinstated as per existing.
5. See accompanying AquaTec drawings for kit details
6. Minimum bend radius 2.0m

PUMP STATION NOTES

Pressure Sewer Pump units to be as follow:

- Royal Engineers Office (REO) and Slaughter Bay - Aquatec Simplex OGT 1500L + 1100L SV storage
- All other pumps - Aquatec Enduraplex OGT 950L

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
B	For Detailed Design	ACS	ESG	ACS	ACS	19/10/23
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

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Client: Australian Government, Department of Infrastructure, Transport, Regional Development and Communications

Project Title: Norfolk Island
KAVHA Wastewater Scheme

Sheet Title: Stage 3
Cemetery Bay
Layout Plan

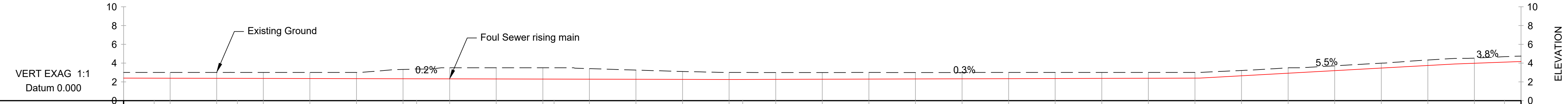
Scale (A1 Original) 1:500 m

Issue: For Detailed Design

Project No	Sheet	Revision
000770	C101	B

0 10 20 30 40 50 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\03_Cad\DESIGN_Stage3_Cemetary

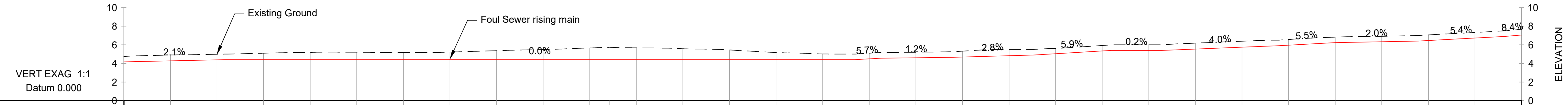


STATION (m)	GROUND LEVEL (m) (Existing)
3.28	3.00
5.00	3.00
10.00	3.00
12.22	3.00
15.00	3.00
20.00	3.00
25.00	3.00
30.00	3.32
30.52	3.33
35.00	3.50
40.00	3.50
45.00	3.50
46.21	3.50
50.00	3.41
55.00	3.26
60.00	3.11
65.00	3.00
65.66	3.00
70.00	3.00
75.00	3.00
80.00	3.00
85.00	3.00
90.00	3.00
95.00	3.00
100.00	3.00
105.00	3.00
110.00	3.00
115.00	3.00
120.00	3.21
125.00	3.49
130.00	3.71
135.00	3.99
140.00	4.33
145.00	4.53
148.22	4.69

PIPE COVER (m): 750 mm minimum cover | 600 mm minimum cover

PIPE TYPE: 40OD PE100 HDPE PN16

STATION 0 - 150

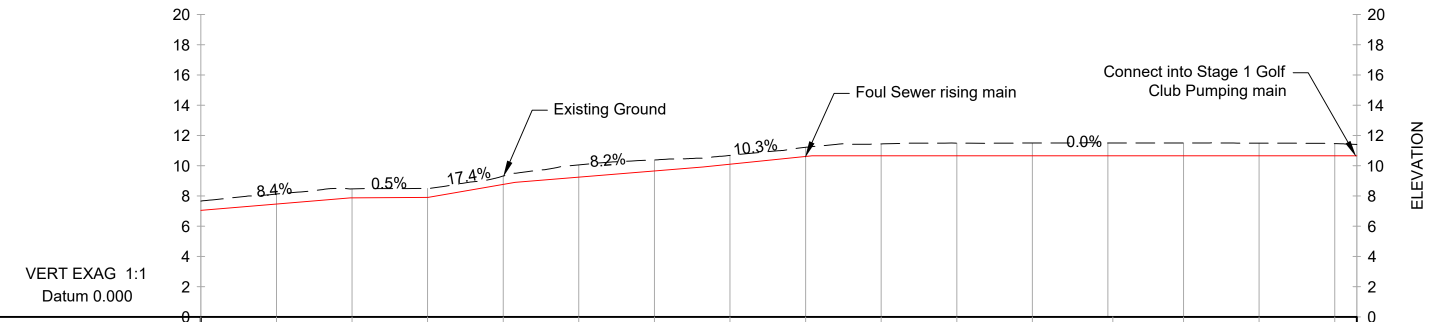


STATION (m)	GROUND LEVEL (m) (Existing)
150.00	4.75
155.00	4.90
160.00	4.98
165.00	5.10
170.00	5.19
175.00	5.20
180.00	5.18
185.00	5.21
190.00	5.36
195.00	5.49
200.00	5.66
202.09	5.73
205.00	5.67
210.00	5.58
215.00	5.44
220.00	5.17
225.00	5.01
230.00	5.10
235.00	5.20
240.00	5.32
245.00	5.50
250.00	5.62
255.00	5.93
260.00	6.00
265.00	6.18
270.00	6.38
275.00	6.57
280.00	6.83
285.00	6.92
290.00	7.06
295.00	7.32

PIPE COVER (m): 600 mm minimum cover

PIPE TYPE: 40OD PE100 HDPE PN16

STATION 150 - 300



STATION (m)	GROUND LEVEL (m) (Existing)
300.00	7.67
305.00	8.13
310.00	8.47
315.00	8.50
320.00	9.32
325.00	10.06
330.00	10.39
335.00	10.69
340.00	11.22
345.00	11.44
350.00	11.50
355.00	11.50
360.00	11.50
365.00	11.50
370.00	11.50
375.00	11.46

PIPE COVER (m): 600 mm minimum cover

PIPE TYPE: 40OD PE100 HDPE PN16

STATION 300 - 376

LONGSECTIONS

1:250 at A1
1:500 at A3

Revision		Des	Drn	Rvd	App	Date
B	For Detailed Design	ACS	ESG	ACS	ACS	19/10/23
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

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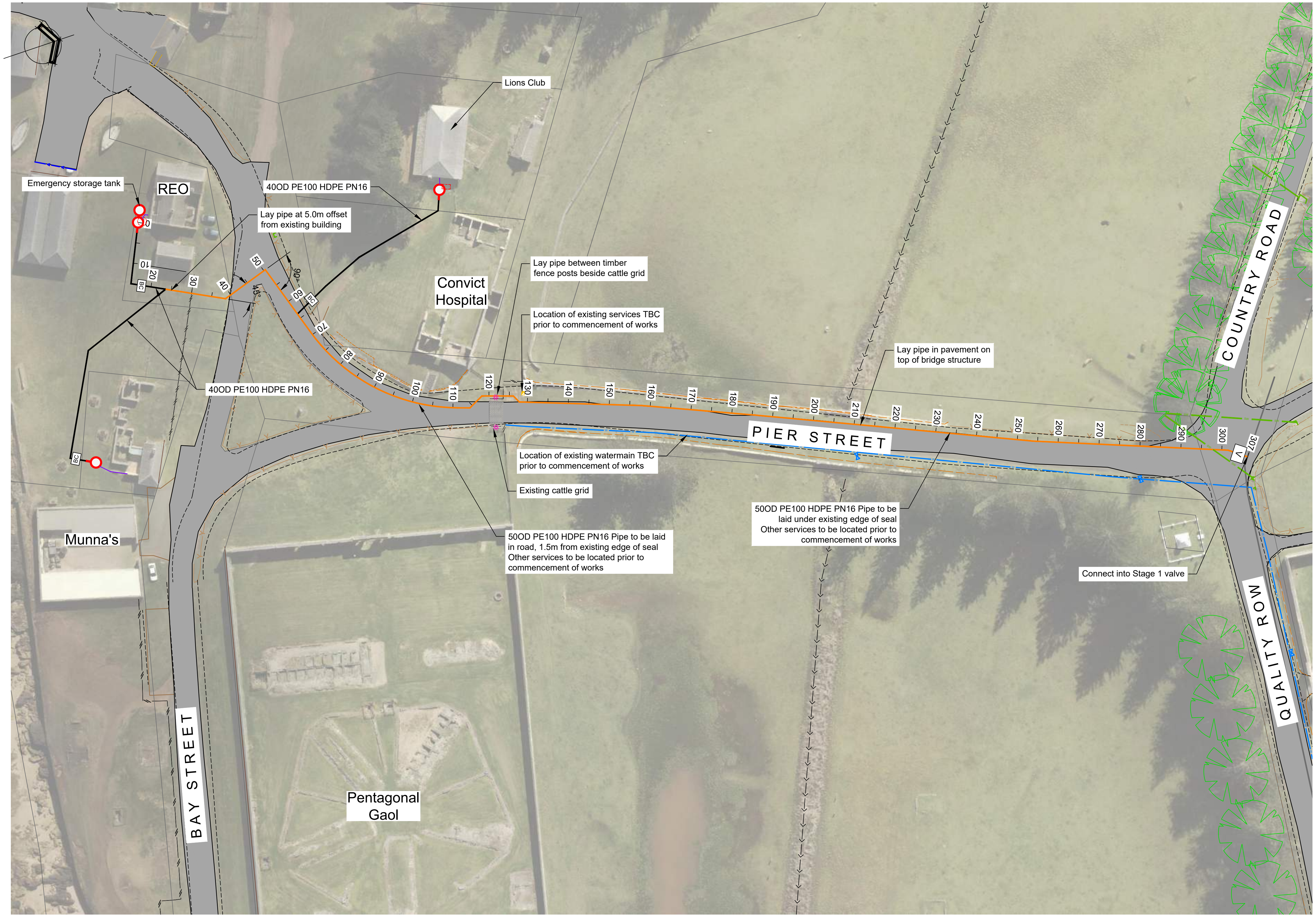
Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 3
Cemetery Bay
Longsections

Scale (A1 Original) 1:250 m
Issue: For Detailed Design
Project No: 000770
Sheet: C102
Revision: B

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\03_Cadd\DESIGN_Stage3_Cemetary



LAYOUT PLAN

1:500 at A1
1:1000 at A3

LEGEND

- Existing water
- Existing stormwater (open watercourse)
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
- Existing property boundary
- Existing septic tanks to be decommissioned (see General Notes)
- Proposed pump station (see Pump Station Notes)
- FP Flushing Point Kit (see Note 5)
- V Isolation Valve Kit (see Note 5)
- BC Boundary Connection Kit (see Note 5)
- Proposed Rising Main PN16 40 mm OD PE100
- Proposed Rising Main PN16 50 mm OD PE100
- Proposed Rising Main PN16 63 mm OD PE100

GENERAL NOTES

1. Services locations shown on the plans are indicative only, and may be incomplete. Location of all existing services to be confirmed on site prior to commencing of any works.
2. Existing septic tanks to be decommissioned where shown. Upon completion of new pump stations and foul sewer system, drain, disinfect, cut hole in base, cut roof of tank, collapse in and fill existing septic tank.
3. New underground power supply to pump stations to be taken from property building - confirm location of power route on site.
4. All trench work to be reinstated as per existing.
5. See accompanying AquaTec drawings for kit details
6. Minimum bend radius 2.0m

PUMP STATION NOTES

Pressure Sewer Pump units to be as follow:
- Royal Engineers Office (REO) and Slaughter Bay - Aquatec Simplex OGT 1500L + 1100L SV storage
- All other pumps - Aquatec Enduraplex OGT 950L

SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Revision		Des	Drn	Rvd	App	Date
B	For Detailed Design	ACS	ESG	ACS	ACS	19/10/23
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 3
Pier Street
Layout Plan

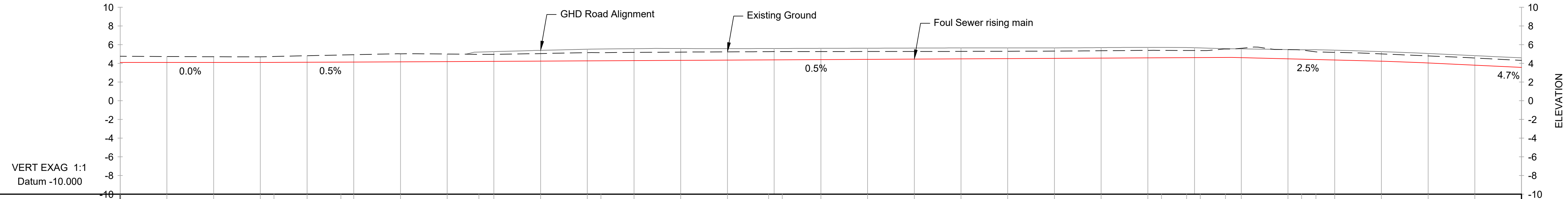
Scale (A1 Original) 1:500 m

Issue
For Detailed Design

Project No	Sheet	Revision
000770	C201	B

0 10 20 30 40 50 mm 75 mm 100 mm

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\Stage 3\FPRO_000770_Stage 3_Pier Precinct

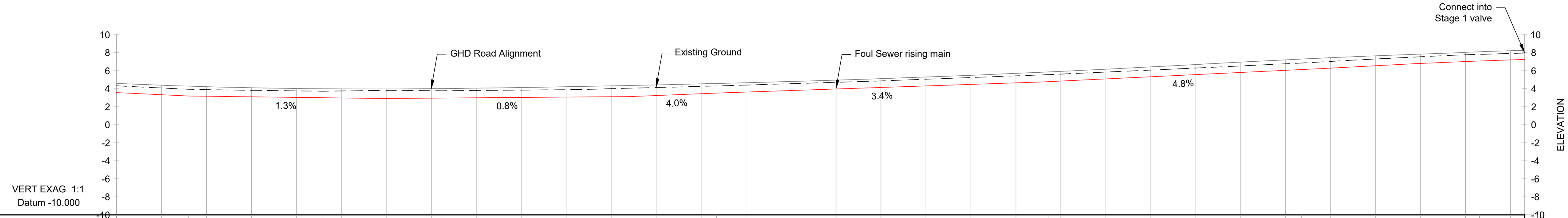


STATION (m)	GROUND LEVEL (m) (Existing)
0.00	
5.00	4.73
10.00	4.71
15.00	4.70
15.04	4.70
20.00	4.82
23.63	4.90
25.00	4.93
30.00	5.02
35.00	5.00
38.40	4.97
40.00	4.97
45.00	5.04
50.00	5.15
50.45	5.15
55.00	5.17
60.00	5.21
65.00	5.23
69.40	5.25
70.00	5.26
75.00	5.26
80.00	5.27
85.00	5.27
90.00	5.28
95.00	5.30
100.00	5.31
105.00	5.35
110.00	5.39
111.08	5.39
114.15	5.37
115.00	5.37
118.31	5.54
120.00	5.62
125.00	5.47
125.98	5.46
127.99	5.23
130.00	5.18
135.00	5.01
140.00	4.80
145.00	4.58

PIPE COVER (m): 600mm Minimum Cover | 750mm Minimum Cover

PIPE TYPE: 40OD PE100 HDPE PN16 | 40OD PE100 HDPE PN16

STATION 0 - 150



STATION (m)	GROUND LEVEL (m) (Existing)
150.00	4.32
155.00	4.09
157.99	3.95
160.00	3.91
165.00	3.83
170.00	3.77
172.97	3.73
175.00	3.75
180.00	3.78
185.00	3.79
186.20	3.78
190.00	3.81
195.00	3.86
200.00	3.90
205.00	4.01
210.00	4.14
215.00	4.27
216.70	4.31
220.00	4.41
225.00	4.56
230.00	4.72
235.00	4.87
240.00	5.06
245.00	5.25
250.00	5.43
253.66	5.57
255.00	5.63
260.00	5.85
265.00	6.08
270.00	6.30
275.00	6.54
280.00	6.77
281.76	6.86
285.00	7.04
290.00	7.31
295.00	7.55
300.00	7.78
301.56	7.82
305.00	7.92
306.56	

PIPE COVER (m): 750mm Minimum Cover

PIPE TYPE: 40OD PE100 HDPE PN16

STATION 150 - 306.56

LONGSECTIONS

1:250 at A1
1:500 at A3

Revision		Des	Drn	Rvd	App	Date
B	For Detailed Design	ACS	ESG	ACS	ACS	19/10/23
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

Verify all dimensions on site before commencing work. Prioritise figured dimensions over scaling. Refer all discrepancies to the drawing office.

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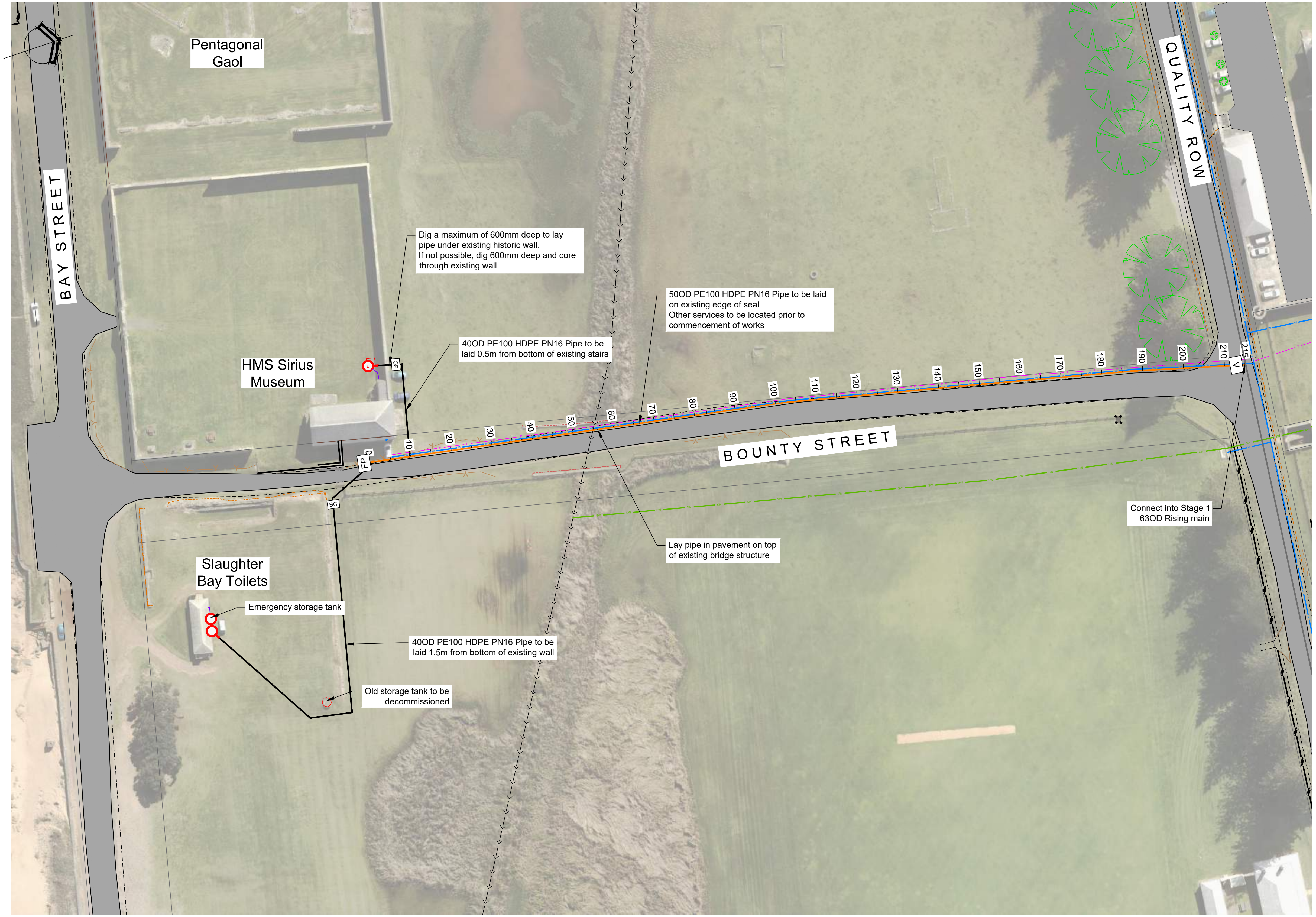
Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 3
Pier Street
Longsections

Scale (A1 Original) 1:250 m
Issue For Detailed Design
Project No 000770 **Sheet** C202 **Revision** B

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\4_Production\Stage 3\PRO_000770_Stage 3_Pier Precinct



LAYOUT PLAN

1:500 at A1
1:1000 at A3

LEGEND

- Existing water
- Existing stormwater (open watercourse)
- Existing stormwater (culvert / piped)
- Existing power (underground)
- Existing power (overhead)
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- Proposed Rising Main PN16 40 mm OD PE100
- Proposed Rising Main PN16 50 mm OD PE100
- Proposed Rising Main PN16 63 mm OD PE100

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SURFACE DATA

- Surface levels have been based on the scale 1 data and coordinate system used to prepare the detail survey (provided by Abbott & Macro) for the KAVHA project site

Rev	Revision	Des	Drn	Rvd	App	Date
B	For Detailed Design	ACS	ESG	ACS	ACS	19/10/23
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

Fluent SOLUTIONS
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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

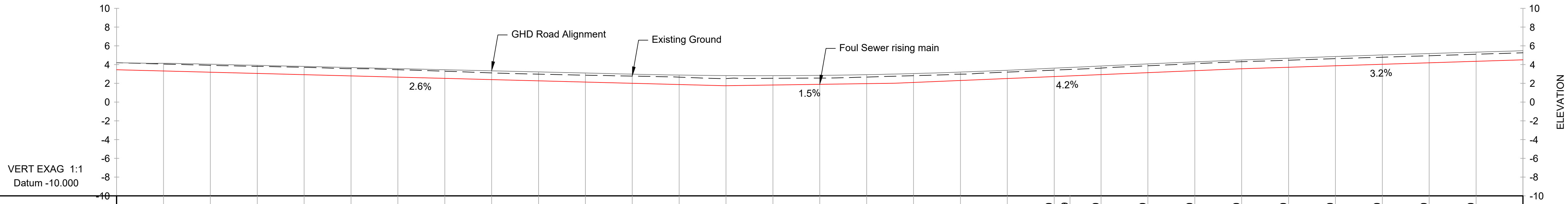
Sheet Title
Stage 3
Bounty Street
Layout Plan

Scale (A1 Original) 1:250 m

Issue For Detailed Design

Project No	Sheet	Revision
000770	C301	B

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\Stage 3\PRO_000770_Stage 3_Bounty Street

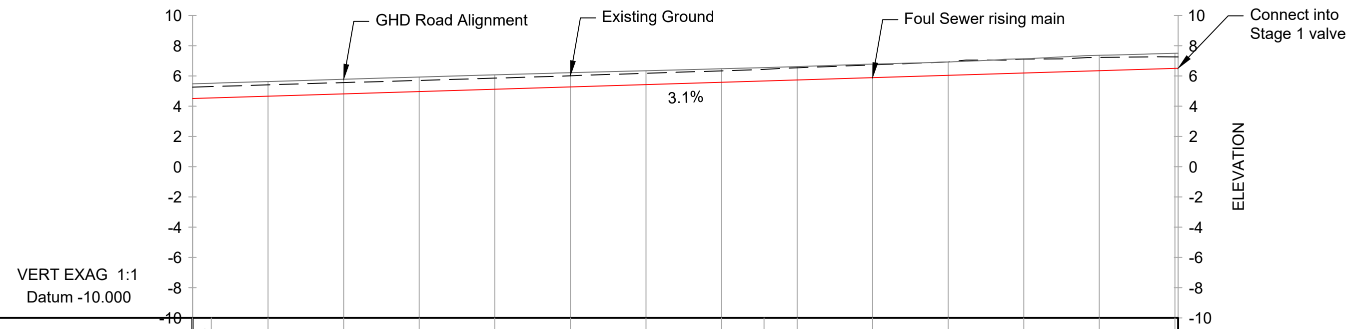


STATION (m)	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
GROUND LEVEL (m) (Existing)	4.06	3.92	3.81	3.71	3.57	3.46	3.30	3.12	2.98	2.87	2.77	2.67	2.51	2.54	2.56

STATION (m)	80.00	85.00	90.00	95.00	100.00	101.69	105.00	110.00	115.00	120.00	125.00	130.00	135.00	140.00	145.00
GROUND LEVEL (m) (Existing)	2.67	2.82	2.98	3.20	3.41	3.48	3.63	3.88	4.10	4.31	4.47	4.63	4.79	4.95	5.11

PIPE COVER (m)	750mm Minimum Cover
PIPE TYPE	40OD PE100 HDPE PN16

STATION 0 - 150



STATION (m)	150.00	151.24	155.00	160.00	165.00	170.00	175.00	180.00	185.00	187.82	190.00	195.00	200.00	205.00	210.00	215.00
GROUND LEVEL (m) (Existing)	5.26	5.30	5.41	5.56	5.70	5.85	6.01	6.18	6.34	6.44	6.54	6.73	6.93	7.11	7.23	7.26

PIPE COVER (m)	750mm Minimum Cover
PIPE TYPE	40OD PE100 HDPE PN16

STATION 150 - 215

LONGSECTIONS
1:250 at A1
1:500 at A3

File: Z:\2_Jobs\000761 - 000770\000770 - Norfolk Island WW-STG 2&3\6_Drawings\04_Production\Stage 3\PRO_000770_Stage 3_Bounty Street

Revision		Des	Drn	Rvd	App	Date
B	For Detailed Design	ACS	ESG	ACS	ACS	19/10/23
A	For Detailed Design	ACS	ESG	ACS	ACS	24/08/23

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Client
Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

Project Title
Norfolk Island
KAVHA Wastewater Scheme

Sheet Title
Stage 3
Bounty Street
Longsections

Scale (A1 Original) 1:250 m

Issue For Detailed Design

Project No	Sheet	Revision
000770	C302	B

0 10 20 30 40 50 mm 75 mm 100 mm