



## **KAI IWI LAKES BOAT BIOSECURITY WASHDOWN**

DOMAIN ROAD, OMAMARI

### **ENGINEERING DESIGN MEMORANDUM DETAILED DESIGN REPORT**

## COOK COSTELLO


### DOCUMENT CONTROL RECORD

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Client:	Kaipara District Council
Address:	Domain Road, Omamari
CCL Reference:	14576
Project description:	Kai Iwi Lakes Boat Biosecurity Washdown
Document Name:	Kai Iwi Lakes Boat Biosecurity Washdown Detailed Design
Date of issue:	Monday, 24 February 2020
Status:	For issue

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Version	Date	Comment	
1.0	18 February 2020	For issue	Anamika Nampoothiry
2.0	24 February 2020	Rev 1 - Detail changes	Anamika Nampoothiry

## TABLE OF CONTENTS

<b>1 INTRODUCTION .....</b>	<b>5</b>
<b>Background.....</b>	<b>5</b>
<b>Project description.....</b>	<b>5</b>
<b>Site Description .....</b>	<b>6</b>
<b>Relevant documents .....</b>	<b>7</b>
<b>Scope of the report .....</b>	<b>7</b>
<b>2 WATER RECLAMATION SYSTEM DESIGN .....</b>	<b>8</b>
<b>Washdown Facility.....</b>	<b>8</b>
<b>Wash Pad Design .....</b>	<b>11</b>
<b>Treatment System Components and Sizing .....</b>	<b>11</b>
2.1.1 Field Sump .....	11
2.1.2 Underground Tank System .....	11
2.1.3 Pumps and Filtration .....	12
2.1.4 Possible further treatment .....	13
<b>Controlled Discharge Point .....</b>	<b>14</b>
<b>Operation and Maintenance .....</b>	<b>14</b>
<b>3 COST ESTIMATES .....</b>	<b>15</b>
<b>4 LIMITATIONS.....</b>	<b>17</b>
<b>5 APPENDICES .....</b>	<b>18</b>
<b>Appendix A – Scala Penetrometer Tests.....</b>	<b>18</b>
<b>Appendix B – Design Drawings.....</b>	<b>19</b>

**FIGURES**

Figure 1: Site Location ..... 6

Figure 2: Existing Wetland ..... 7

Figure 3: Proposed facility location. View to East. Wash pad proposed location on left of image, Get Ready and Trailer Parking on right of image. See drawing sheet C02 for the general arrangement of the boat wash area. .... 8

Figure 4: Proposed washdown facility - general arrangement. See sheet C02 of the drawing set in Appendix B. .... 10

**TABLES**

Table 1: Storage tank water balance ..... 9

Table 2: Surface mount feed pump sizing..... 12

Table 3: Reclaimed water quality requirements ..... 13

## 1 Introduction

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### Background

In line with Aim 3 and 4 outlined within the Kaipara District Council Reserve Management Plan for Kai Iwi Lakes (Taharoa Domain) 2016, the Council is committed to protecting the natural environment and pristine waters within the District through imposing biosecurity controls on activities. Cook Costello have been engaged to design a boat biosecurity washdown facility at Kai Iwi Lakes to facilitate with the removal of biological contaminants (aquatic weeds, fish eggs etc.) from recreational boats and trailers.

### Project description

The objective of this work is to design a practical and pragmatic washdown facility incorporating a water reclamation system with minimal operational and maintenance cost, along with overflow risk management during extreme storm events.

This design report covers the following detailed design information:

- The existing site conditions and proposed site layout
- The proposed equipment configuration
- The proposed wash water reclamation system
- The existing power supply/distribution

## Site Description

The site is located adjacent to Lake Taharoa, one of the three natural freshwater lakes within the Kai Iwi Lakes vicinity. The only access to the site is via Domain Road running from west to east, leading to the camping ground. The existing site aerial photograph is shown in Figure 1.



**Figure 1: Site Location**

The proposed wash down facility is located at the existing access entrance to the only boat launching site on Lake Taharoa. The area on the northern side of Domain Road available for facility is approximately 650m<sup>2</sup>. The existing ground is covered by soil and grass (greenfield). A Scala Penetrometer test indicates well in excess of 100kPa allowable bearing strength is available. The complete Scala Penetrometer test plot is provided in Appendix A. This section of land is situated on a relatively higher, gently sloped ground with approximately 2 to 3% fall towards the west. The unpaved track on the west is the only traffic access way leading down to Lake Taharoa boat launching bay.

To the south of Domain Road is a grassed site that gently slopes west down towards a wetland catchment, as seen in Figure 1 Google Earth imagery, indicates that a small part of this grassed area is used as an informal car and boat trailer parking area.



*Figure 2: Existing Wetland*

## Relevant documents

The following documents have been used or referenced in the preparation of this report.

- BeforeUDig: Services Location
- Kaipara District Council: Reserve Management Plan: Kai Iwi Lakes (Taharoa Domain) 2016
- Kaipara District Council: Engineering Standards 2011
- MBIE: New Zealand Building Code Clause E1 Surface Water
- NIWA: HIRDSv4
- NIWA – The Climate and Weather of Northland, 3<sup>rd</sup> Edition
- Northland Regional Council: River and Rainfall Data – Kai Iwi Lakes Road
- NZWERF: On-Site Stormwater Management Guideline 2004

## Scope of the report

This report aims to develop the preliminary design of the proposed boat washdown system to provide a detailed design, including engineering drawings and indicative cost estimates.

The treatment system is required and designed to remove both the biological contaminants of concern along with suspended solids and hydrocarbons.



## 2 WATER RECLAMATION SYSTEM DESIGN

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### Washdown Facility



*Figure 3: Proposed facility location. View to East. Wash pad proposed location on left of image, Get Ready and Trailer Parking on right of image. See drawing sheet C02 for the general arrangement of the boat wash area.*

### Design Specifications

#### DEMAND

Boat launching figures have not been available for this study and projections are based on anecdotal evidence that gives an estimated peak season 50 boats/day and a low season estimate of 20 boats/day. It is anticipated that the wash time per boat is 10 minutes and the proposed power wash nozzles deliver 21L/min. During periods where both power washers are in use the flow rate through the treatment system is 0.7L/s.

#### RAINFALL

The monthly mean rainfall depths compiled by Northland Regional Council for the Kai Iwi Lakes Road recording station have been utilised to assess the system water input gains. The monthly rainfall figures include small events that would not produce runoff. To account for this a factor of 85% has been applied to the monthly rainfall depth when calculating the runoff gain.

Water losses from the system are primarily from evaporation and wetting. Uncertainty exists in the evaporation loss figures as the only available source is the evapotranspiration potential from the NIWA Northland Climate Report. The selected values are the mean values from the Kaitaia Observatory. An element of conservatism has been incorporated by applying the losses to the



entire pad area and it has been assumed wetted for the whole day during the peak period. During the off-peak winter period it is assumed to be wetted for half of the day.

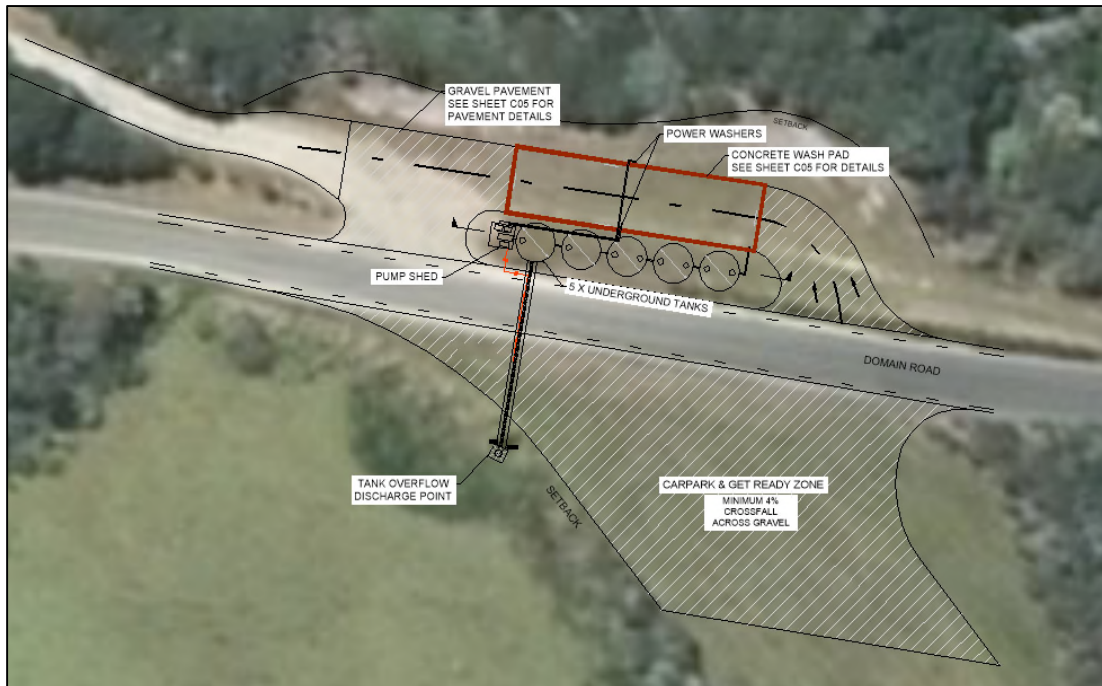
	Rainfall	Gain	Evaporation	Losses	Net
Month	mm/month	m <sup>3</sup>	mm/month	m <sup>3</sup>	m <sup>3</sup>
Jan	63	5.00	145	13.5	-8.48
Feb	86	6.78	120	11.2	-4.38
Mar	70	5.56	105	9.8	-4.21
Apr	80	6.29	67	3.1	3.18
May	105	8.29	46	2.1	6.16
Jun	119	9.43	32	1.5	7.94
Jul	123	9.69	38	1.8	7.93
Aug	122	9.67	52	2.4	7.25
Sep	117	9.24	70	3.3	5.99
Oct	67	5.30	98	9.1	-3.82
Nov	67	5.27	116	10.8	-5.51
Dec	76	6.02	136	12.6	-6.63

**Table 1: Storage tank water balance**

Between October and March, the expected mean loss from the system is 33m<sup>3</sup>, and between April and September the system has a mean gain of 38m<sup>3</sup>. The proposed minimum storage is 25m<sup>3</sup> and it is expected this would need to be topped up once each summer. To reduce this top up frequency a storage volume totalling 50m<sup>3</sup> would be sufficient to buffer the gains and losses and also minimise the overflow event frequency.

For initial filling and periodic top up it is proposed clean water be transported to the facility by water cart or water extracted from the closest water body of Lake Taharoa (if permitted).

## PROPOSED SYSTEM



**Figure 4: Proposed washdown facility - general arrangement. See sheet C02 of the drawing set in Appendix B.**

The proposed wash down facility in the above figure consists of two power washers and a concrete pad, surrounded by a trafficable kerb, which allows multiple boat trailers to be washed simultaneously. Wash water is recycled through the system with gross pollutants and sediments removed prior to the water being reused. The bunded wash pad is open to the weather with rainfall in part compensating for wash water losses. Being open to the weather, the facility caters for overflow during high rainfall events.

The proposed wash pad location is on the section of land to the north of Domain Road. On the northern edge of this generally flat area the ground drops away steeply and the pad will be setback for safety to prevent fall from height and to mitigate potential slope stability issues. To allow for vehicle with trailer tracking curves the facility will be accessed from the southern side of Domain Road. This area also serves as a location for the boats to get ready prior to launching during busy periods. Vehicle sightlines have been checked on site and are sufficient subject to some minor vegetation clearance at the eastern side of the road frontage.

## **Wash Pad Design**

The proposed wash pad is approximately 23.4m in length and 6.2m in width, with an included 5m vehicle overhang area. The bunded wash pad will be constructed with minimum slope of 2% to facilitate wash water recollection through grated field sump. The wash pad details can be found in drawing C05.

## **Treatment System Components and Sizing**

The proposed development consists of a 145m<sup>2</sup> concrete wash pad and a series of underground storage tanks of approximately 12,500 and 25,000L in capacity.

The proposed wash pad is designed to drain the boat wash water into the field sump by gravity and subsequently into the underground treatment system as shown in drawing C03. The wash water after treatment, ultimately returned to the storage tank for reuse.

### **2.1.1 Field Sump**

The field sump is a standard 675 x 450mm flat top cess pit and will be as per KDC standards as shown in drawing sheet C05.

#### ***LittaTrap***

LittaTrap is a pre-treatment device that will be installed in the 675 x 450mm field sump in order to screen the debris, litter and gross pollutants larger than 5mm from the wash water before releasing this water into the clarifier tanks for treatment. The filter basket can be easily removed to dispose trapped debris and the frequency of cleaning shall be reviewed and determined by on-site operators.

### **2.1.2 Underground Tank System**

The underground tank system configuration is detailed in drawing C04.

The underground water tanks have roofs that are designed for light vehicle loading (<2500kg) only. The underground tanks have been placed ensuring sufficient clearance from Domain Road pavement seal to comply with the minimum distance of 1.5m from the road, as recommended by the manufacturer to prevent any lateral loading damage to the tanks from the Domain Road traffic. The tanks have been placed at 0.6m from each other as per standard practice.

The maximum allowable cover on the proposed tank system is 300mm of topsoil as shown in drawing sheet C04. The lids are non-trafficable.

### **Concrete Tanks and Lids**

Three 12,500 L circular concrete tanks in series are proposed as clarifiers. Following these will be two 25,000L tanks for the estimated 50m<sup>3</sup> water storage.

All tanks will have double lids to provide access to the inlets and outlets and the spreader bars.

### **Spreader Bars**

Spreader bars will be installed inside at the inlet and outlet of each tank to reduce short circuiting and eddying in the tank. This will slow the flow down and prevent settled sediments from getting disturbed.

### **Floating Outtake**

The final tank in the treatment system, Tank 5 in C04, will have a 50mm floating outtake connected to the 40mm pressure pipe outlet using a reducing bush. The floating outtake ensures that the cleanest portion of the water column is pumped out for reuse, avoiding any remaining dirt that may be accumulated at the water surface.

## **2.1.3 Pumps and Filtration**

### **Pump Shed**

The pump shed shown in drawing C03 houses a surface mount feed pump, two super filters, two HP pumps and the necessary power connection components.

The pump housing will be 2.2 x 2.2m as suggested by the pump supplier.

The surface mount centrifugal pump is required to lift water up from the underground tank and pass it through the screen filters. Given that the pump has efficiency of at least 50%, the pump size is determined as summarised in Table 2 below.

<b>Head Difference (m)</b>	2.0
<b>Pressure/Suction Head (Bar)</b>	0.22
<b>Allowance To Avoid Cavitation (Bar)</b>	2
<b>Minimum Flow Required (L/s)</b>	0.7
<b>Minimum Power Required (kW)</b>	0.31
<b>Next Available Pump Size (kW)</b>	0.55

*Table 2: Surface mount feed pump sizing*

Recycled water from the underground storage will be drawn up by the 1.5kW surface mounted centrifugal pump before feeding into the inline 50µ screen filters with the flow then distributed to the spray nozzles by two 5.5kW HP pumps.

For the two HP (High Pressure) pumps, a few alternatives were recommended by Spray Pump Services. From them, the 140 bar, 21L/min, 5.5 kW each option was chosen. The pumps will be placed on a single skid and located within a shed for security and weather proofing.

### ***Filters***

Spray Pump Services have recommended the following criteria shown in Table 3 as basic requirements for reclaimed water.

Particle Size (micron)	50
TSS (ppm)	50
pH	5 to 9

***Table 3: Reclaimed water quality requirements***

The two Amiad 50mm T super filters in parallel on a manifold with two 50 $\mu$  screen filters, with a screen area of 750cm<sup>2</sup> each, achieves the water quality requirements given above. The screen filters shall be cleaned, maintained or replaced regularly according to manufacturers' recommendation.

### ***Power Supply***

Power for the pump components will be harnessed by a connection from the existing underground power supply (11kV) across the road as shown in C03.

### ***Float switch and Pump inhibiting circuit***

A floating switch element and a low-level pump inhibiting circuit is suggested so that the pump stops pumping out water when the final storage tank water level, from which the reuse water is drawn out, is below 25% of the tank's total capacity. In addition, indicator lights will be installed to signal when the tank water level is at its 50% capacity and 30% capacity.

#### **2.1.4 Possible further treatment**

UV treatment of the wash water is not presently proposed. Should the biological contaminants of concern be less than 50 $\mu$  this additional treatment step could be located downstream of the screen filters.

### **Controlled Discharge Point**

The overflow from the last storage tank in the treatment train i.e. Tank 5, is piped to a controlled discharge point across Domain Road as can be seen from drawing sheet C02 in Appendix B. The sole objective of this discharge point is to allow storage tank water to overflow and prevent backflow in the treatment train following an extreme storm event.

The controlled discharge point is designed to be a manhole with a scruffy dome at the top. The overflow point details are given in C05 of the drawing set.

### **Operation and Maintenance**

All components in the treatment system including the Littatrap, tanks, pumps and filters will follow the will follow suppliers' operation and maintenance manuals and/or guidelines. A complete set of operation and maintenance guide will be provided at commissioning.

### 3 Cost Estimates

COOK COSTELLO LTD			REFERENCE: 14576		
PROJECT: KDC Biosecurity Boat Wash			DATE: 18/02/2020		
SITE: Kai Iwi Lakes					
Indicative construction cost estimate					
				ESTIMATE	
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
100 ESTABLISHMENT					
101	Preliminary & General	LS	1	\$ 45,000.00	\$45,000
200 EROSION AND SEDIMENTATION CONTROL					
201	Erosion and Sediment Control	LS	1	\$ 5,000.00	\$5,000
300 EARTHWORKS					
301	All clearing as necessary to carry out the works of all vegetation & trees and other deleterious material, hedges, farm fences, gates, old concrete slabs etc within the works area.	LS	1	\$ 1,000.00	\$1,000
302	Strip topsoil and deposit on temporary stockpile	m²	1000	\$ 5.50	\$5,500
303	Cut to fill	m³	204	\$ 22.00	\$4,488
304	Excavate for clarifier and tanks (1.5 - 3m)	m³	500	\$ 20.00	\$10,000
305	Cart surplus material from site to disposal	m³	250	\$ 20.00	\$5,000
306	Backfill, spread and consolidate with excavated material	m³	250	\$ 45.00	\$11,250
307	Supply, place, compact and trim 250mm thick tank bedding	m²	150	\$ 24.00	\$3,600
308	Supply, place, compact 25mm thick sand bedding	m²	150	\$ 10.00	\$1,500
400 PAVEMENT CONSTRUCTION					
401	Gravel surface (get ready, tracking entrance & exit) (150mm)	m²	1251	\$ 18.70	\$23,394
402	Wash bay concrete pad	m²	145	\$ 200.00	\$29,000
403	Trafficable kerb to pad perimeter	m	60	\$ 42.00	\$2,520
500 DRAINAGE, TREATMENT AND STORAGE					
501	Pad channel with grate	m	6	\$ 400.00	\$2,400
502	Cesspit (675 x 450 x 1200)	each	1	\$ 1,790.00	\$1,790
503	Cast iron grate and frame	each	1	\$ 750.00	\$750
504	Littatrap (675 x 450)	each	1	\$ 575.00	\$575
505	Clarifier and storage tanks with lid (12.5m³ x 3 + 25m³ x 2)	each	1	\$ 25,520.00	\$25,520
506	Transport of tank, etc to site	LS	1	\$ 3,500.00	\$3,500



507	Overflow discharge pipe	m	20	\$	35.00	\$700
508	Overflow outlet	LS	1	\$	500.00	\$500
509	Floating Outtake Kit (50mm)	each	1	\$	329.99	\$330
510	Manhole pipe (Ø600) with scruffy dome Type 2	each	1	\$	750.00	\$750
512	Drainage plumbing and fittings	LS	1	\$	2,000.00	\$2,000
<b>600 PUMP, FILTRATION AND WASH</b>						
601	Feed pump unit with small pressure tank, pressure and flow control 0.55kW, Single phase supply	each	1	\$	1,000.00	\$1,000
602	HP Pump units – pump/motor/unloader valve/control 140 Bar 21L/m, 5.5kW	each	2	\$	3,000.00	\$6,000
603	Skid mount for pump	LS	1	\$	500.00	\$500
604	Main pump frame	LS	1	\$	2,200.00	\$2,200
605	Manual HP reel	each	2	\$	390.00	\$780
606	Heavy duty reel stands	each	2	\$	450.00	\$900
607	Float switch with low-level pump inhibiting circuit with light indicators	each	1	\$	2,500.00	\$2,500
608	Filters	each	2	\$	680.60	\$1,361
609	Transport of pumps, shed, etc to site	LS	1	\$	1,000.00	\$1,000
610	Pump / Wash plumbing	LS	1	\$	2,000.00	\$2,000
611	Pump shed with concrete floor	each	1	\$	5,000.00	\$5,000
612	Commissioning	LS	1	\$	3,000.00	\$3,000
<b>700 ELECTRICAL</b>						
701	Northpower proposed electrical connection works	LS	1	\$	40,000.00	\$40,000
702	Underground service main, conduit, trench, backfill, reinstate	m	25	\$	25.50	\$638
703	Switchboard	each	1	\$	2,500.00	\$2,500
<b>800 CONSENT</b>						
801	Building Consent		1	\$	5,000.00	\$5,000
802	Resource Consent		1	\$	1,200.00	\$1,200
<b>900 CONTINGENCY</b>						
901	20% contingency	LS	1			\$52,329
<b>Total excl. GST</b>						<b>\$313,974.47</b>

## 4 LIMITATIONS

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This report has been prepared for the benefit of Kaipara District Council as our client with respect to providing an engineering assessment of the proposed boat biosecurity washdown facility. It shall not be relied upon for any other purpose. The reliance by other parties on the information or opinions contained in this report shall, without our prior review and agreement in writing, be at such parties' sole risk.

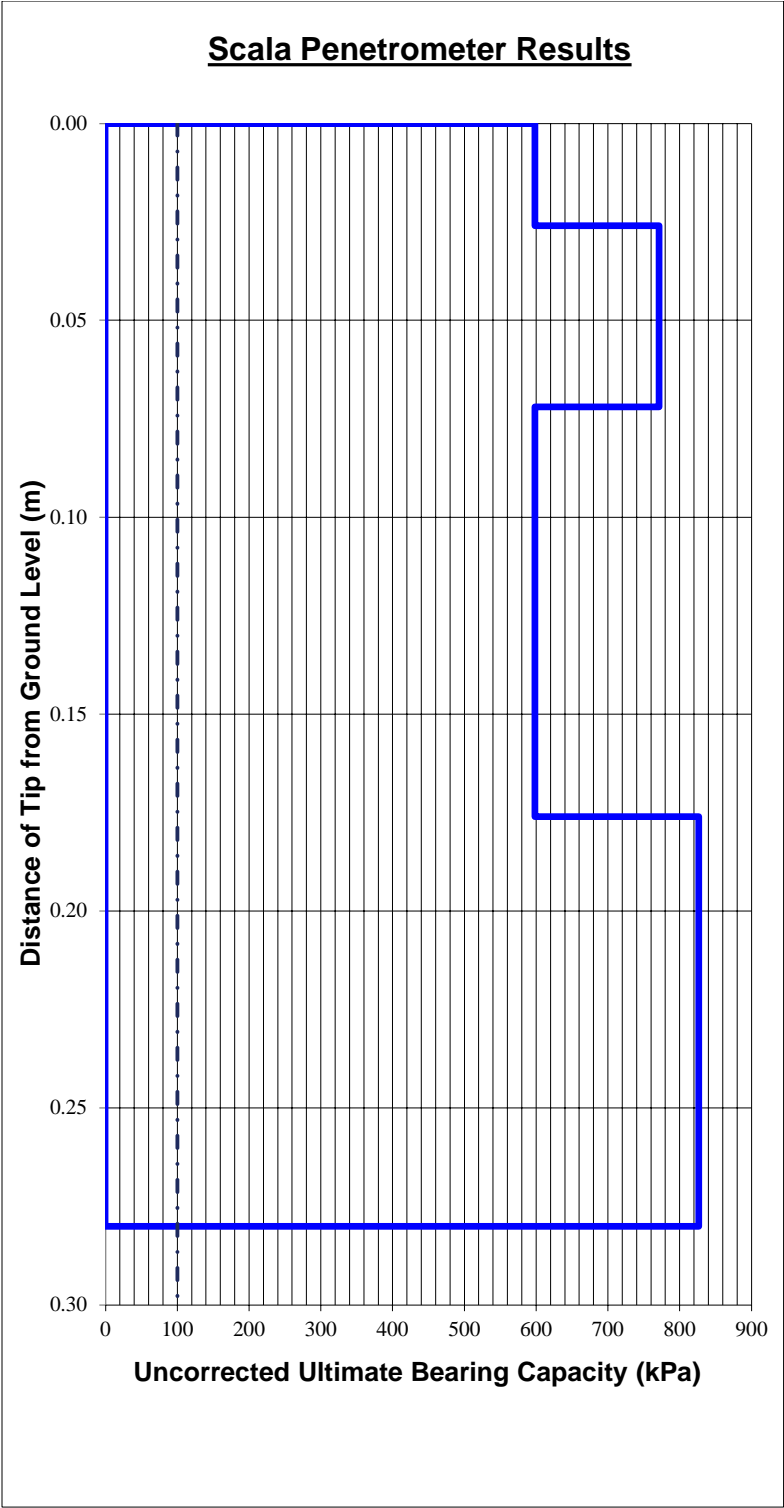
Opinions and judgments expressed herein are based on our understanding and interpretation of existing council GIS information, current regulatory standards, and should not be construed as legal opinions. Where opinions or judgments are to be relied on, they should be independently verified with appropriate legal advice.

CCL 2015 Ltd. would be pleased to provide further service to Kaipara District Council for construction coordination and believe that the project would benefit from such continuity.

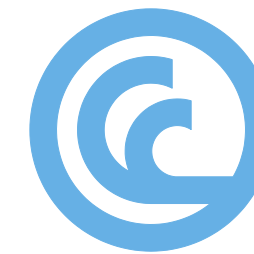
CCL 2015 Ltd. have performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for this assessment. No guarantees are either expressed or implied.

5 Appendices

Appendix A – Scala Penetrometer Tests




## **Appendix B – Design Drawings**



**cook | costello**

**FOR CONSENT**

  
SIGNED

24/02/2020  
DATE

## PROPOSED CIVIL DETAIL DESIGN PLANS

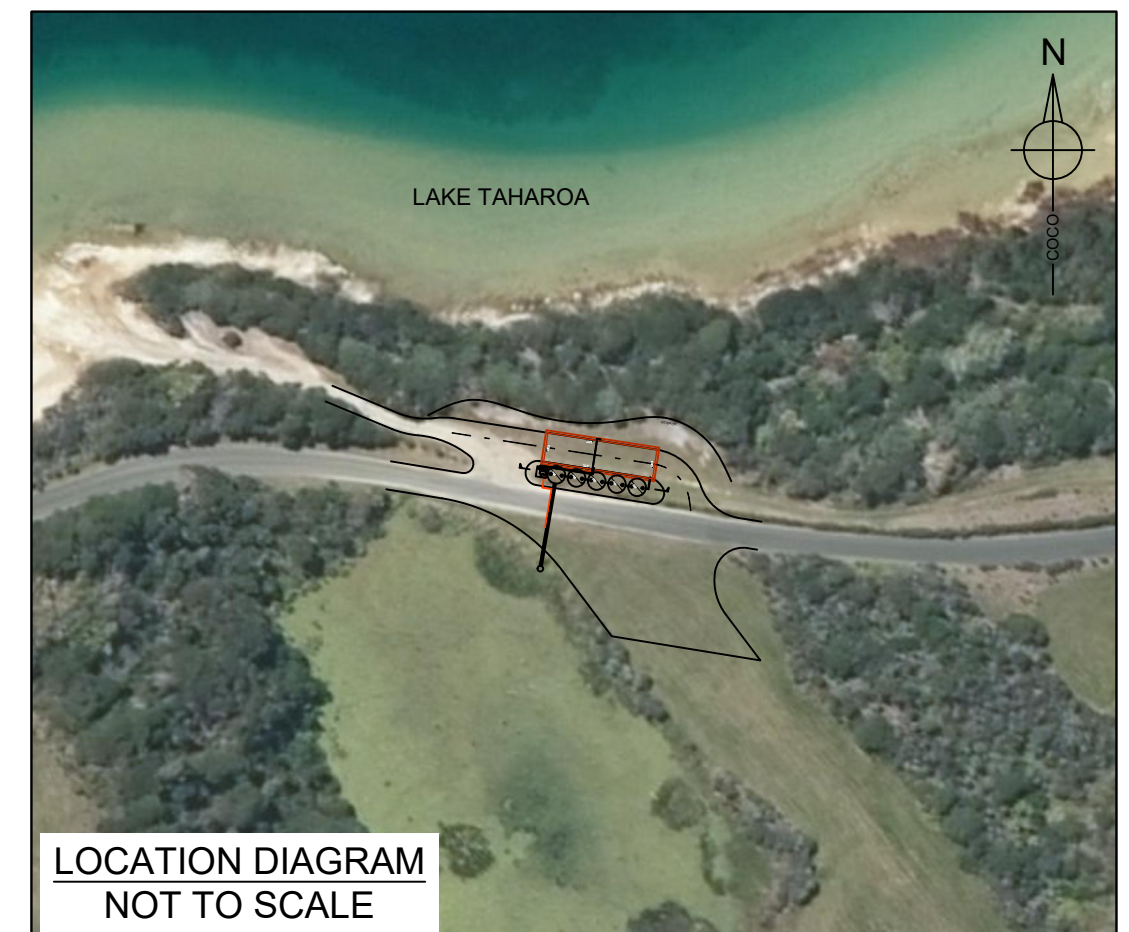
**FOR KAIPARA DISTRICT COUNCIL,  
KAI IWI LAKES BOAT BIOSECURITY  
WASHDOWN,  
DOMAIN RD, OMAMARI**

JOB NO:14576  
DATE: 24 FEBRUARY 2020

SCHEDULE OF DRAWINGS		
SHEET #	TITLE	REV
C00	COVER SHEET	A
C01	GENERAL NOTES	A
C02	GENERAL ARRANGEMENT OF BOAT WASH AREA	C
C03	UNDERGROUND SYSTEM CONFIGURATION AND WASHPAD PLAN VIEW	C
C04	UNDERGROUND SYSTEM CONFIGURATION	C
C05	CONCRETE WASHPAD AND CONTROLLED DISCHARGE POINT DETAILS	A
C06	KDC TYPICAL BEDDING AND BACKFILL DETAILS	A
C07	PUMP SHED - ELECTRICALS SCHEMATIC	A

**IMPORTANT NOTE: PRODUCER STATEMENTS**

PS4 WILL NOT BE ISSUED AT COMPLETION OF WORKS UNLESS ALL REQUIRED TESTS AND  
INSPECTIONS HAVE BEEN NOTIFIED TO COOK COSTELLO AND COMPLETED DURING CONSTRUCTION



DWG NUMBER	REV.
C00	A

GENERAL

G1: THIS SET OF DRAWINGS IS TO BE READ IN CONJUNCTION WITH THE PROJECT SPECIFICATION AND ALL OTHER CONTRACT DRAWINGS.

G2: THE DRAWINGS ARE A DIAGRAMMATIC REPRESENTATION OF THE WORK TO BE CARRIED OUT ONLY AND DIMENSIONS SHALL NOT BE OBTAINED BY SCALING.

G3: ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER FOR DECISIONS BEFORE PROCEEDING WITH THE WORK.

G4: THE CONTRACTOR IS TO CONFIRM THE LOCATION AND LEVEL OF ALL UNDERGROUND SERVICES PRIOR TO UNDERTAKING ANY EARTHWORKS OR FOUNDATION CONSTRUCTION.

G5: ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE CURRENT CODES OF PRACTICE EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION AND/OR DRAWINGS:

- NZS 3101:2017 CONCRETE STRUCTURES STANDARD
- NZS 3109 CONCRETE CONSTRUCTION
- NZS 3121 WATER AND AGGREGATE FOR CONCRETE
- AS/NZS 4671 STEEL REINFORCING MATERIALS

G6: GENERAL ABBREVIATIONS

- NTS - NOT TO SCALE
- UNO - UNLESS NOTED OTHERWISE
- FFL - FINISHED FLOOR LEVEL
- EGL - EXISTING GROUND LEVEL
- FGL - FINISHED GROUND LEVEL

G7: WHERE PROPRIETARY PRODUCTS ARE SPECIFIED IN THE DOCUMENTS THE CONTRACTOR MAY SUBMIT AN ALTERNATIVE PRODUCT FOR APPROVAL AND SUBJECT TO KAIPARA DISTRICT COUNCIL APPROVAL.

G8: ALL WORKS ARE TO COMPLY WITH THE HEALTH & SAFETY AT WORK ACT 2015.

G9: ALL WORKS SHALL BE PREFORMED IN ACCORDANCE WITH THE APPROVED ENGINEERING PLANS, PROJECT SPECIFICATION AND ALL OTHER CONTRACT DRAWINGS AND TO BE SUBJECT TO THE KDC ES, 2011 AND USED IN CONJUNCTION WITH NZS4404:2010.

G10: KDC STANDARD DETAILS HAVE NOT BEEN INDEPENDENTLY VERIFIED BY COOK COSTELLO. WE HAVE ACCEPTED THAT THEY WILL PERFORM FOR THE REQUIRED LIFE EXPECTANCY AS STATED IN THE KDC ES, 2011. WE ACCEPT NO LIABILITY IF THE STANDARD DETAILS DO NOT ACHIEVE THIS DESIGN LIFE.

G11: ALL LEVELS & CONNECTION POINTS TO BE CHECKED & CONFIRMED ON SITE PRIOR TO CONSTRUCTION. ATTENTION TO LEVELS IS OF CRITICAL IMPORTANCE TO THIS DESIGN.

G12: EROSION CONTROL - ALL SILT CONTROL MEASURES SHALL BE PLACED PRIOR TO COMMENCEMENT OF EARTHWORKS. SUCH MEASURES SHALL BE SUBJECT TO FURTHER ADDITIONS AND ALTERATIONS, WHERE CONSIDERED NECESSARY, AS DIRECTED BY THE PROJECT MANAGER OR COUNCIL, DURING THE PROGRESSION OF WORKS. IT IS ADVISED TO CONTACT NRC PRIOR TO COMMENCEMENT OF EARTHWORKS, AFTER INSTALLATION OF EROSION AND SEDIMENT CONTROL DEVICES TO ENSURE THEY HAVE BEEN INSTALLED TO THE SATISFACTION OF NRC.

CONCRETE

C1: ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH NZS3109 AND NZS3101 SUBJECT TO RELEVANT SECTIONS OF THE SPECIFICATION.

C2: NO CONCRETE SHALL BE PLACED UNTIL THE DESIGNER HAS HAD THE OPPORTUNITY TO OBSERVE THAT THE DRAWINGS AND SPECIFICATIONS HAVE BEEN COMPLIED WITH.

C3: ALL CONCRETE SUPPLY AND PRODUCTION SHALL BE IN ACCORDANCE WITH NZS 3104, 3101:2017.

C4: WHERE THE LOCATION OF CONSTRUCTION JOINTS IS NOT SPECIFICALLY DETAILED ON THE STRUCTURAL DRAWINGS, CONSTRUCTION JOINTS SHALL BE COORDINATED WITH THE ENGINEER AS REQUIRED. THE CONSTRUCTOR SHALL ALLOW FOR ALL SUCH CONSTRUCTION JOINTS.

CONCRETE PAVEMENTS

CP1: UPON EXPOSURE OF SUBGRADE AT PAVEMENT BASE CONTACT ENGINEER FOR INSPECTION AND INSTRUCTION TO REMOVE AND REPLACE ANY SOFT AREAS PRIOR TO COMMENCING CONSTRUCTION OF PAVEMENT LAYERS. EXCAVATED MATERIAL TO BE REMOVED FROM SITE.

CP2: SUPPLY AND COMPACT BASECOURSE LAYER IN ACCORDANCE WITH CROSS SECTIONS SUPPLIED.

CP3: CONCRETE USED SHALL BE SPECIAL GRADE WITH 28 DAY COMPRESSIVE STRENGTH OF 30MPA.

CP4: ALL CONCRETE SHALL BE CURED BY AN APPROVED METHOD FOR AT LEAST 7 DAYS AFTER POURING. CURING METHOD SHALL BE PROPOSED TO ENGINEER FOR APPROVAL. SOME PROPRIETARY SURFACE TREATMENTS MAY NOT BE APPROVED.

EARTHWORKS

E1: ALL SITE EARTHWORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF NZS4431. SOIL BEARING CAPACITY IS TO BE VERIFIED UPON COMPLETION OF SITE EARTHWORKS AND DURING FOUNDATION EXCAVATION TO ENSURE ACTUAL SITE CONDITIONS ARE COMPATIBLE WITH THE INFERRED GEOTECHNICAL MODEL. OVER EXCAVATION AND BACKFILLING WITH ENGINEERED FILL OR SITE CONCRETE MAY BE NECESSARY WHERE SOFT SOIL / FILL IS ENCOUNTERED WITH PRIOR VARIATION APPROVAL.

E2: COMPACTION IN BASE OF PIPE TRENCHES TO ACHIEVE CLEGG 10.

STORMWATER DRAINAGE

SW1: ALL WORK AND MATERIALS SHALL COMPLY WITH THE PROJECT DRAWINGS AND SPECIFICATIONS AND CURRENT KDC STANDARDS AND SPECIFICATIONS. ANY CONFLICT BETWEEN THE PROJECT DOCUMENTS AND COUNCIL STANDARDS SHALL BE RAISED WITH THE ENGINEER FOR RESOLUTION, PRIOR TO CONSTRUCTION.

SW2: ALL TRENCH EXCAVATION SHALL COMPLY WITH ALL WORKPLACE HEALTH AND SAFETY REQUIREMENTS.

SW3: THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, CERTIFICATION, APPROVAL AND CONSTRUCTION OF ALL TEMPORARY WORKS INCLUDING BOTH STRUCTURAL ENGINEERING AND GROUNDWATER CONTROL. SUITABLY QUALIFIED PROFESSIONALS CARRYING ACCEPTABLE LEVELS OF PROFESSIONAL INDEMNITY INSURANCE SHALL BE PROPOSED TO THE ENGINEER BEFORE WORK COMMENCEMENT AND THE USE OF ANY PERSONS UNDERTAKING THIS TYPE OF WORK SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

SW4: FOR PIPE BEDDING, SURROUND AND BACKFILL DETAILS REFER TO PIPE BEDDING DETAILS.

SW5: WHERE PIPES ARE LAID IN FILL THE FILL SHALL BE PLACED TO FINAL SURFACE LEVELS BEFORE TRENCHING IS COMMENCED. THE FILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 200MM LOOSE THICKNESS AND COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS FOR EARTHWORKS (IF REQUIRED). A CERTIFICATE PROVIDED BY THE CONTRACTOR'S INDEPENDENT TESTING AGENCY CONFIRMING THE FILL MEETS THE SPECIFIED COMPACTION STANDARDS SHALL BE PROVIDED BEFORE ANY PIPE LAID IN NEW FILL WILL BE APPROVED BY THE ENGINEER OR ACCEPTED BY THE CONTROLLING AUTHORITY.

INSPECTIONS / SITE VISITS REQUIRED

I1: PRE-CONSTRUCTION SITE MEETING WITH CONTRACTOR, ENGINEER AND KDC PRESENT. NRC TO BE INFORMED OF WORKS ON SITE PRIOR TO COMMENCING WORKS.

I2: STRIPPED GROUND INSPECTIONS OF CROSSING, PAD, TANK SUBGRADE AND SITE FILL AREAS.

I3: CONTROLLED FILL TESTING TO BRING FILL UP TO SUBGRADE LEVELS TO BE CONSTRUCTED IN 200mm MAX LIFTS AND TESTED EVERY 600mm.

I4: SUBBASE PAVEMENT TESTING FOR ROAD IN ACCORDANCE WITH PAVEMENT DETAILS. CONTRACTOR TO ALSO PROVE SUBBASE METAL DEPTHS WITH STRING LINES

I5: BASECOURSE PAVEMENT TESTING FOR ROAD AND CROSSINGS IN ACCORDANCE WITH PAVEMENT DETAILS. CONTRACTOR TO ALSO PROVE BASECOURSE METAL DEPTHS WITH STRING LINES.

I6: STORMWATER TRENCH COMPACTION TEST

I7: REINFORCED CONCRETE WASHPAD - PREPOUR CONCRETE INSPECTION FOR CHECKING OF CROSSING DIMENSIONS AND REINFORCING PLACEMENT WITH ENGINEER AND KDC PRESENT.

I8: FINAL INSPECTION WITH KDC ENGINEER AND CONTRACTOR TO ENSURE ALL WORKS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE APPROVED ENGINEERING PLANS FOR FINAL SIGNOFF.

IMPORTANT NOTE: PRODUCER STATEMENTS

PS4 WILL NOT BE ISSUED AT COMPLETION OF WORKS UNLESS ALL REQUIRED TESTS AND INSPECTIONS HAVE BEEN NOTIFIED TO COOK COSTELLO AND COMPLETED DURING CONSTRUCTION



LAKE TAHAROA



- NOTES:
- 1. ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH WORK.
  - 2. ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK.
  - 3. COMPLY WITH ALL WORKSAFE NZ ONSITE HEALTH AND SAFETY REQUIREMENTS AT ALL TIMES.
  - 4. COOK COSTELLO ACCEPT NO LIABILITY FOR UNAUTHORIZED CHANGES FROM THE DETAILS AND INFORMATION CONTAINED IN THESE DRAWINGS.
  - 5. GENERAL ARRANGEMENT OF THE PROPOSED BOAT WASHDOWN FACILITY AT KAI IWI LAKES (WGS84 -35.812799, 173.646591)



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C	DETAILED DESIGN	24-02-20	AN	AT
B	DETAILED DESIGN	06-11-19	KAH	AT
A	1ST ISSUE	10-06-19	KAH	AT
REV.	REVISION DETAILS	DRAWN APP.		

PROJECT DETAILS

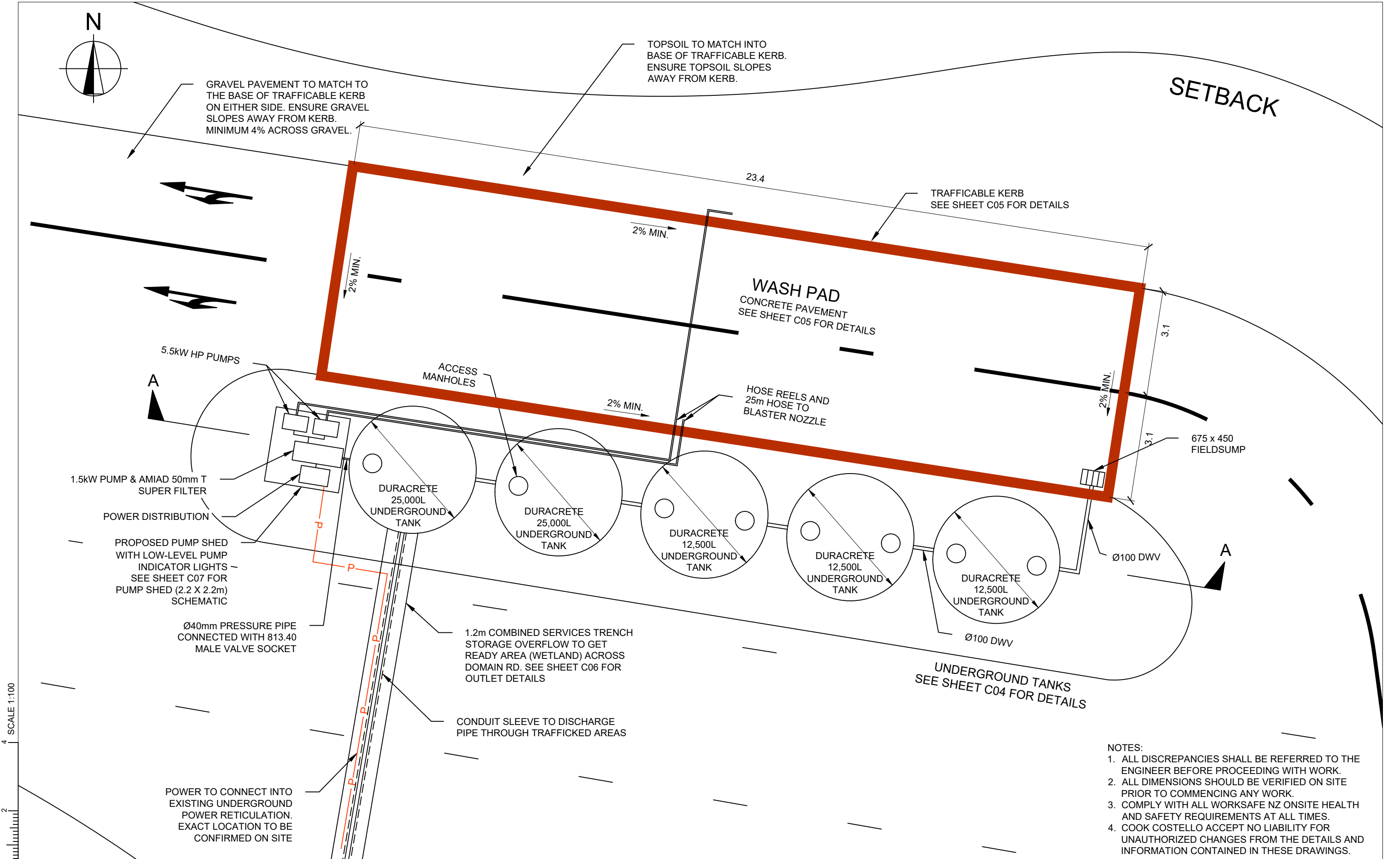
KAIPARA DISTRICT COUNCIL  
KAI IWI LAKES  
SECTION 63  
BLK I KAIWI SD

TITLE

GENERAL ARRANGEMENT  
BOAT WASH AREA

DATE CREATED 10-06-2019	DRAWN K HANSARD	DESIGNED YH CHONG	APPROVED A TONKS
CCL REF NO 14576	SCALE 1:400 @ A3	STATUS FOR CONSENT	
DWG NUMBER C02		REVISION C	





- NOTES:
1. ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH WORK.
  2. ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK.
  3. COMPLY WITH ALL WORKSAFE NZ ONSITE HEALTH AND SAFETY REQUIREMENTS AT ALL TIMES.
  4. COOK COSTELLO ACCEPT NO LIABILITY FOR UNAUTHORIZED CHANGES FROM THE DETAILS AND INFORMATION CONTAINED IN THESE DRAWINGS.



C	DETAILED DESIGN	24-02-20	AN	AT
B	DETAILED DESIGN	06-11-19	KAH	AT
A	1ST ISSUE	22-07-19	KAH	AT
REV.	REVISION DETAILS	DRAWN APP.		

PROJECT DETAILS

KAIPARA DISTRICT COUNCIL  
KAI IWI LAKES  
SECTION 63  
BLK I KAIWI SD

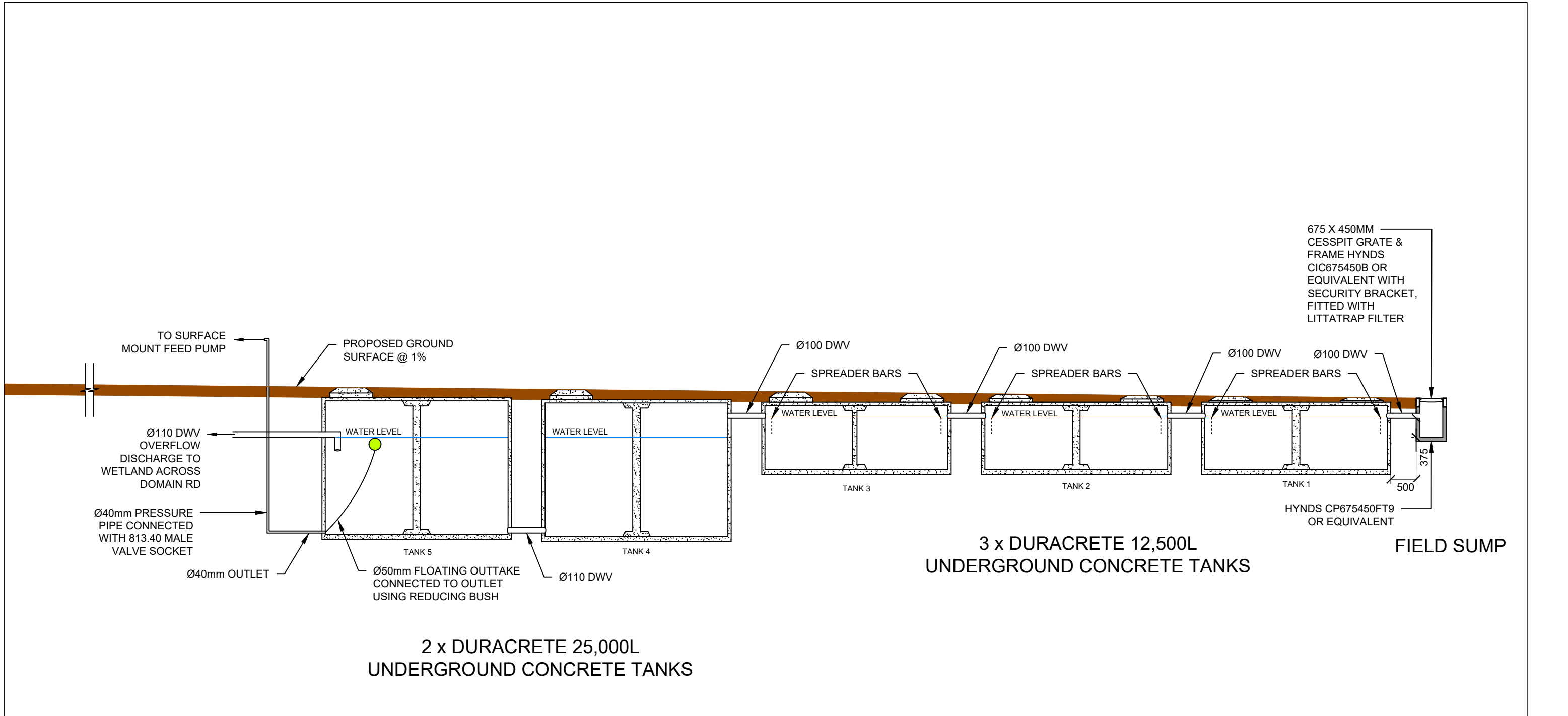
TITLE

WASHPAD AND UNDERGROUND SYSTEM  
CONFIGURATION  
PLAN VIEW

DATE CREATED 22-07-2019	DRAWN K HANSARD	DESIGNED YH CHONG	APPROVED A TONKS
CCL REF NO 14576	SCALE 1:100 @ A3	STATUS FOR CONSENT	
DWG NUMBER C03		REVISION C	

4 SCALE 1:100

0 2 4 SCALE 1:100



SECTIONAL ELEVATION A-A

SCALE 1:75

- NOTES:
- 1. ADOPT MINIMUM CLASS SN4 DWV PIPES TO COMPLY WITH KDC ENGINEERING STANDARDS.
  - 2. FIELD SUMP SPECIFICATIONS TO COMPLY WITH KDC ENGINEERING STANDARDS - DRAWING S29 (SEE SHEET C05). THE CONTRACTOR IS TO UNDERTAKE SUITABLE WATER TEST TO CHECK FOR WATER TIGHTNESS.
  - 3. BEDDING AND BACKFILL OF PIPES TO COMPLY WITH KDC ENGINEERING STANDARDS - DRAWING S25 (SEE SHEET C04).
  - 4. TANK INSTALLATION AND PREPARATION TO COMPLY WITH DURACRETE SPECIFICATIONS
  - 5. ALL TANKS TO HAVE DOUBLE LIDS AND SPREADER BARS AT THE INLET AND OULET.

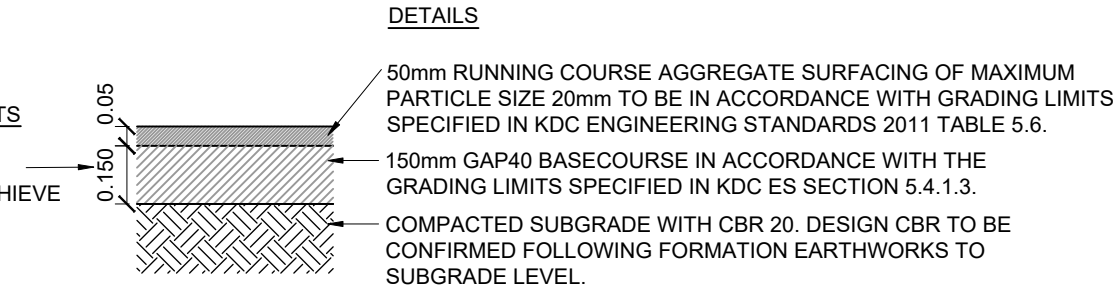
REV.	C	DETAILED DESIGN	24-02-19	AN	AT
	B	DETAILED DESIGN	06-11-19	KAH	AT
	A	1ST ISSUE	22-07-19	KAH	AT
	REVISION DETAILS		DRAWN APP.		

PROJECT DETAILS  
KAIPARA DISTRICT COUNCIL  
KAI IWI LAKES  
SECTION 63  
BLK I KAIWI SD

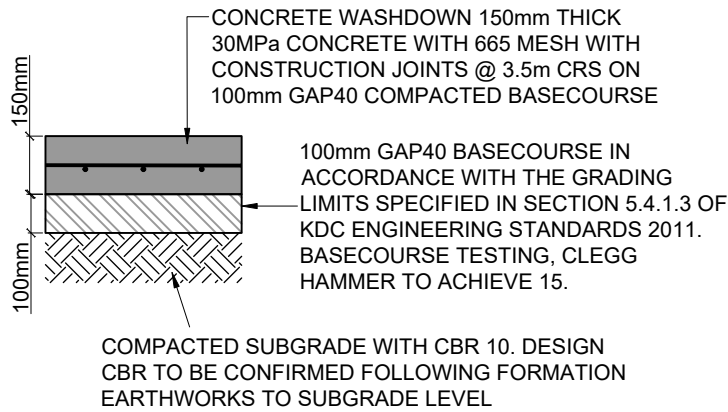
TITLE  
UNDERGROUND SYSTEM CONFIGURATION

DATE CREATED	22-07-2019	DRAWN	K HANSARD	DESIGNED	YH CHONG	APPROVED	A TONKS
CCL REF NO	14576	SCALE	1:75 @ A3	STATUS FOR CONSENT			
DWG NUMBER	C04	REVISION C					

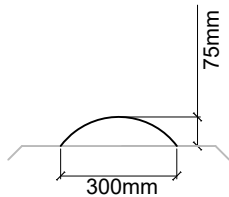
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0.6  
0.4  
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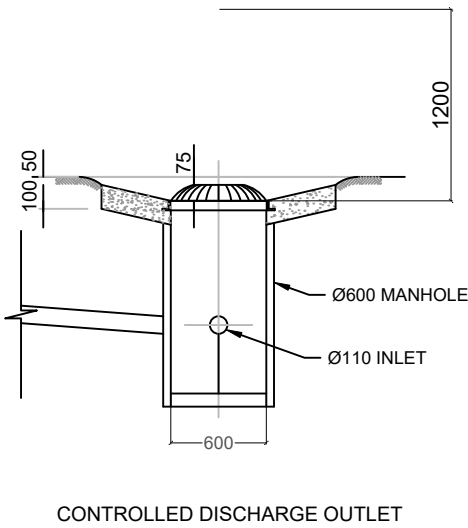
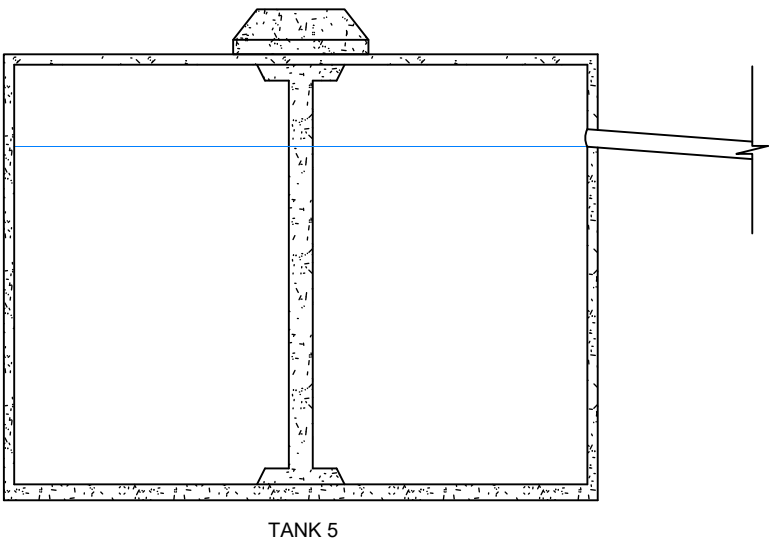
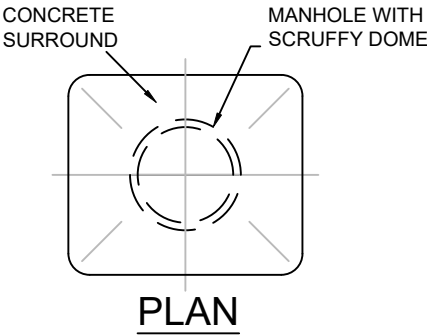
**PAVEMENT DETAILS FOR GRAVEL AREA**  
SCALE 1:20



**PAVEMENT DETAILS FOR WASHPAD**  
SCALE 1:20



**TRAFFICABLE KERB DETAILS FOR WASHPAD**  
SCALE 1:20



**CONTROLLED DISCHARGE POINT DETAILS**  
NOT TO SCALE

- NOTES:
1. ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH WORK.
  2. ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK.
  3. COMPLY WITH ALL WORKSAFE NZ ONSITE HEALTH AND SAFETY REQUIREMENTS AT ALL TIMES.
  4. COOK COSTELLO ACCEPT NO LIABILITY FOR UNAUTHORIZED CHANGES FROM THE DETAILS AND INFORMATION CONTAINED IN THESE DRAWINGS.

A	REVISION DETAILS	DRAWN APP.

PROJECT DETAILS		
KAIPARA DISTRICT COUNCIL		
KAI IWI LAKES		
SECTION 63		
BLK I KAIWI SD		
24-02-20		
AN AT		

TITLE	
CONCRETE WASHPAD AND CONTROLLED DISCHARGE POINT DETAILS	

DATE CREATED	DRAWN	DESIGNED	APPROVED
10-02-2020	K HANSARD	YH CHONG	A TONKS
CCL REF NO	SCALE	STATUS	
14576	AS SHOWN @ A3	FOR CONSENT	
DWG NUMBER	REVISION		
C05	A		

PIPE SIZE (mm)	CLASS	MIN. COVER (mm)	MAX. COVER (m)
225	3 (Y)	300	3.0
	2 (X)	500	2.4
300	4 (Z)	300	-
	3 (Y)	400	3.0
	2 (X)	700	2.0
375	4 (Z)	300	-
	3 (Y)	400	3.0
	2 (X)	700	1.8
450	4 (Z)	300	-
	3 (Y)	400	3.0
	2 (X)	700	1.8
525	4 (Z)	300	-
	3 (Y)	400	3.0
	2 (X)	700	1.8
600	4 (Z)	300	-
	3 (Y)	400	3.0
	2 (X)	500	2.0
750	3 (Y)	300	3.0
	2 (X)	500	2.0
900	3 (Y)	-	3.0
1050	2 (X)	300	2.0
1200			

<u>PIPE SIZE (mm)</u>	<u>MIN. COVER (mm)</u>	<u>MAX. COVER (m)</u>
300	300	3.0
375	300	
450	300	
600	300	
750	375	
900	450	
1050	525	
1200	600	

**IPLEX TRANSIT - SPEC. CULVERTS**

PIPE SIZE (mm)	MIN. COVER (mm)	MAX. COVER (m)
225 - 475	300	3.0

**ALI-TUFF PIPES** (16mm Gauge)

PIPE SIZE (mm)	MIN. COVER (mm)	MAX. COVER (m)
300 - 1200	600	Manufacturers Specification

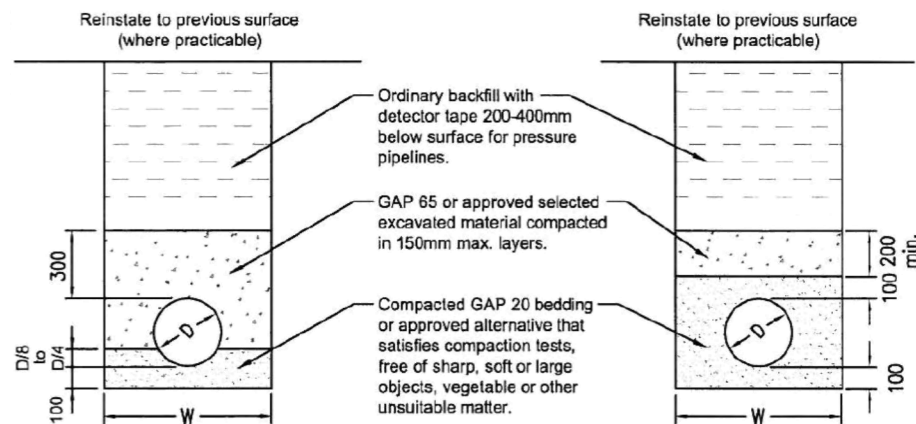
Diagram illustrating the construction of a 150mm bedding layer for a detector loop.

The diagram shows a cross-section of the bedding layer, which is 600 mm thick (minimum). The bedding layer is composed of several layers:

- Top layer: Compacted Basecourse layer (300 or as approved).
- Second layer: GAP 40 - Entrances (mechanically compacted in 150mm layers).
- Third layer: GAP 65 mechanically compacted in 150mm layers (Use detector tape as below).
- Bottom layer: Approved compacted granular Bedding Material or compacted GAP 20 bedding (if specified).

The detector loop is shown as a circle with diameter  $D$  and depth  $D/8$  to  $D/4$ . The bedding layer is 150 mm thick. The total width of the bedding layer is  $D + 600$ . The diagram also shows a sawcut at the top, 150 mm from the centerline.

Crushed aggregate with the following requirements:  
 Crushing resistance 110KN  
 Weathering resistance: AA, AB, AC, BA, BB, CA, CB  
 Clay index: B  
 Sand equivalent: 15  
 Grading: Sieve Size (mm) 19.0 2.36 0.60 0.30 0.15 0.075  
 % Mass Passing 100 100-50 90-20 60-10 25-0 10-0



(Where specifically approved)

(PVC not approved for water supply)

PE pipe bedding aggregate shall not exceed 5% of the Nominal pipe dia.

W	TYPE OF PIPE
D + 600	Aluminium
D + 600	Galvanised Steel
D + 450	Concrete
D + 450	Vitrified Clay
D + 400	uPVC & PE

Variations in **W** require additional design compensation.

1. Concrete pipes to be RCRRJ 'Class X' (or stronger) installed to Manufacturers requirements.
2. Aluminium pipes to be "Alufo" or "Highflo" type design (or similar).
3. Ordinary backfill shall be free from stones or rocks greater than 150mm nominal diameter & compacted in 300mm layers.
4. Replace topsoil to original depth as necessary.
5. Existing sealed roadway excavations are to be resurfaced with 50mm of asphaltic concrete.
6. Privateway basecourse metalling within pipe trenches may be in accordance with the Privateway Standards.
7. Unsatisfactory trench material is to be undercut and replaced with compacted hardfill.  
In poor soils such as swamp/peat material and in rock the minimum depth of granular bedding material below the invert is to be 200mm or Specific design as necessary.
8. Trench width shall not exceed W at the pipe crown level.
9. Pipelines at 1:8 gradient or steeper shall have cement stabilised bedding and/or surrounds.
10. Pipelines at 1:3 gradient or steeper shall have 'weak mix' concrete bedding (10MPa). Large pipes will require Specific pipe design.
11. Concrete bedding shall be allowed to cure for 48 hours prior to backfilling.
12. Backfilling under carriageways may be with 'flowable fill' (low strength fly-ash concrete).
13. Granular bedding is to satisfy N.Z.S 7643 - Appendix B.
14. Minimum cover over pipes (unless specifically designed or protected in accordance with KDC S26), to the highest point or bell, of the outside of the pipe (or collar) in any area shall be :
  - a) 300mm - if not subjected to traffic loading
  - b) Ref. to above charts - under carriageways and trafficked areas.

SHEET S25 KDC EES 2011 - NOT TO SCALE

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4. COOK COSTELLO ACCEPT NO LIABILITY FOR UNAUTHORIZED CHANGES FROM THE DETAILS AND INFORMATION CONTAINED IN THESE DRAWINGS.



A	DETAILED DESIGN	24-02-20	
REV.	REVISION DETAILS	AN	AT

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## KDC TYPICAL BEDDING AND BACKFILL DETAILS

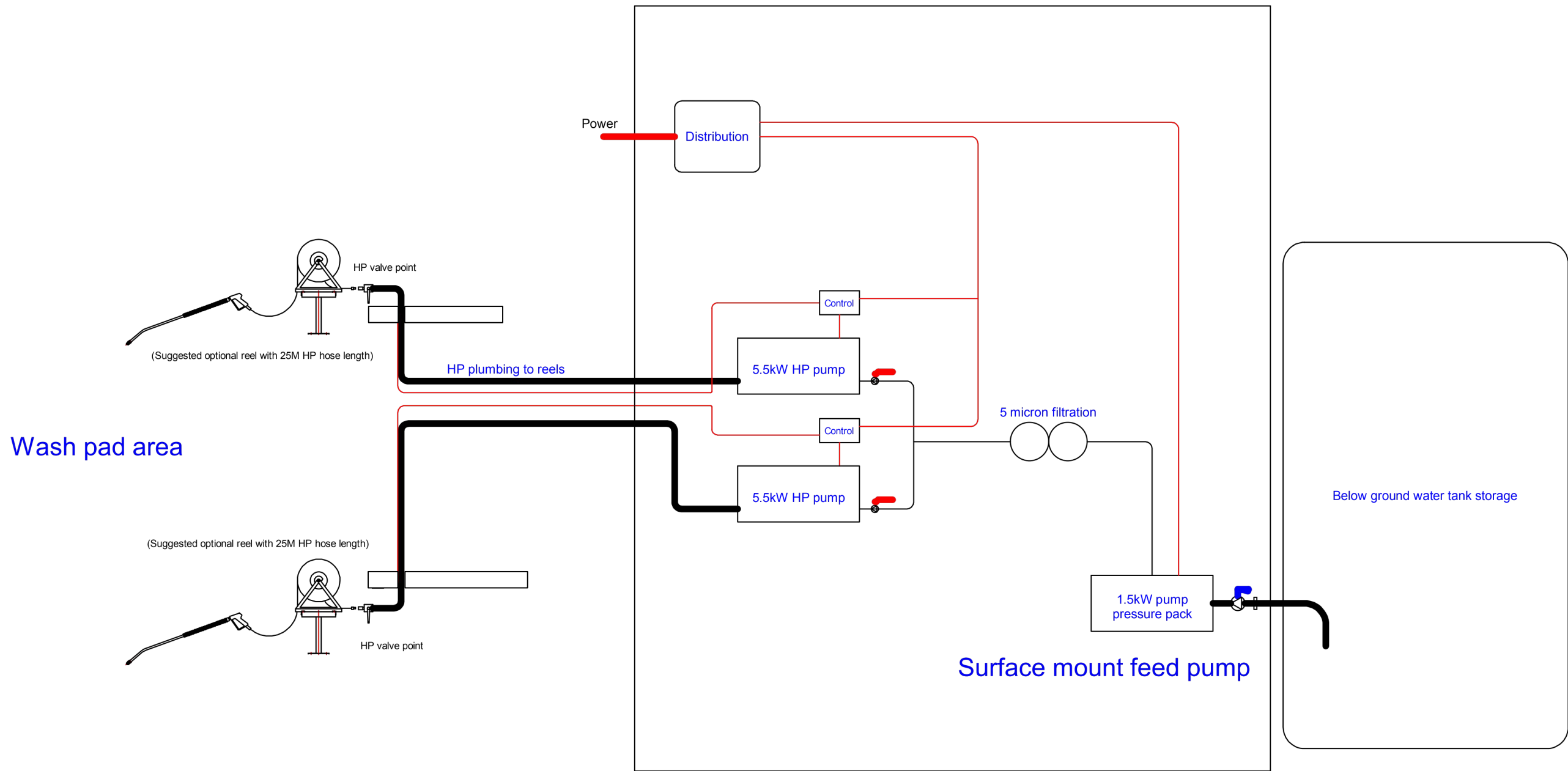
DATE CREATED <b>10-02-2020</b>	DRAWN <b>K HANSARD</b>	DESIGNED <b>YH CHONG</b>	APPROVED <b>A TONKS</b>
CCL REF NO <b>14576</b>	SCALE <b>NTS @ A3</b>	STATUS <b>FOR CONSENT</b>	
DWG NUMBER <b>C06</b>		REVISION <b>A</b>	

DATE PLOTTED: Monday, 24 February 2020 11:48:43 am FILE PATH: Z:\14500 - 14999\14576 - Kai Iwi Lakes boat wash\Cad\14576 Drainage Rev C 06.01.2020.dwg

DO NOT REPRODUCE WITHOUT WRITTEN AUTHORITY



Pump/control enclosure - shed



- NOTES:
- 1. ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH WORK.
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  - 4. COOK COSTELLO ACCEPT NO LIABILITY FOR UNAUTHORIZED CHANGES FROM THE DETAILS AND INFORMATION CONTAINED IN THESE DRAWINGS.
  - 5. SECURE ABOVE GROUND ASSETS WITHIN A 2.2 X 2.2m PUMP SHED.
  - 6. PUMPS AND FILTER INSTALLATION TO COMPLY WITH SPRAY PUMP SERVICES' SPECIFICATIONS

Suggested schematic sketch for layout  
With HP boat wash system installation

A	DETAILED DESIGN	24-02-20	
		AN	AT
REV.	REVISION DETAILS	DRAWN	APP.

PROJECT DETAILS
KAIPARA DISTRICT COUNCIL
KAI IWI LAKES
SECTION 63
BLK I KAIWI SD

TITLE
PUMP SHED ELECTRICALS SCHEMATIC (PROVIDED BY SUPPLIER)

DATE CREATED 10-02-2020	SUPPLIED SPRAY PUMP SERVICES	APPROVED
CCL REF NO 14576	SCALE NTS @ A3	STATUS FOR CONSENT
DWG NUMBER C07		REVISION A