CHINDERAH SERVICE CENTRE - SEWAGE TREATMENT PLANT

For Earth, For Life

Kubota

TRUEWATER AUSTRALIA

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The Chinderah Service Centre opened in late 2016. The centre services northbound traffic on the Pacific Highway near the Queensland boarder.

The development consists of a Caltex petrol station, Coffee Club, Macdonald's, KFC and Oliver's and sees up to 10,000 visitors per day. Upgrades to the Pacific Highway to the south is expected to increase northbound traffic in the coming years.

Figure 1 – Northbound Chinderah Service Centre

The development is located approximately 5km South of the Queensland Border, and is not serviced by existing sewerage service networks. Therefore, it required a Sewage Treatment Plant (STP). The development posed several key challenges for effective sewage management due to seasonal flooding, small size of the site, high ground water, variable peak loads and varied contaminant concentrations.

Key Project Considerations

The Environmental Consultant who completed the council application severely undersized the STP and the Land Application System. The initial system was designed for a peak daily flow of 14kL/day and made no consideration for the medium to high strength sewage that is generated by Service Centres.

True Water undertook to rectify all documentation and amend the council approval to ensure the system would treat realistic hydraulic flows and had provision for future hydraulic increases in line with increased traffic on the Pacific Highway.

The Kubota STP's stage 1 design manages 40kL/day. The 40kL design flow was realised within the first 3 months of operation. The Kubota STP is scalable and is designed to be increased in capacity to 100kL and will be increased in scale as visitation to the site continues to grow.

Hydraulic Flows

Flows vary significantly with seasonal influxes of visitors, therefore the STP must be capable of reliably managing and treating varying flow volumes.

Influent Strength

The Service Centre includes several commercial fast food tenants. While some pre-treatment is undertaken, the STP must be capable of handling influent contaminant concentrations at increased levels.

Reliability

The Chinderah Service Centre is highly visible to highway traffic and is located within a flood prone region. The STP must be highly reliable and include contingency and safe guards to ensure continuity of service at all times, including during flood and power outages.

Figure 2 – Aerial View – Chinderah Service Centre (Pre-Works)

Figure 3 – Aerial View – Chinderah Service Centre (During Civil Construction)

Figure 4 – Aerial View – Chinderah Service Centre (Completion)

Figure 5 – Aerial View – Chinderah Service Centre During 2017 Floods (Note – Mounds are not impacted by flood)

Scott PDI

Owners and developers of the Chinderah Service Centre, Scott PDI is an Australian family-owned infrastructure, construction and materials company.

Focused on long term investment returns, Scott PDI are active investors in the Property assets. Since the groups formation, they have completed an extensive list of retail property developments, finishing over 50 such projects throughout Queensland, New South Wales, Victoria, Tasmania and South Australia.

Scott PDI have worked with most of Australia's largest retailers and understand the process of delivering bulky goods, supermarket anchored shopping centres, discount department stores, hotels with large format liquor barn offers and service stations.

Figure 6 – Chinderah Service Centre Entrance

Assessment of STP Options

Scott PDI in conjunction with Hutchinson Builders undertook extensive research and assessed all sewage treatment solutions and providers available in Australia to find the best outcome for their development.

The assessment involved investigation into multiple treatment technologies, performance history, company background, operational practices and multiple site visits. Additional factors that were assessed included scalability, capital and operational costs, configuration and aesthetics (visual, odour and noise).

When considering site constraints, longevity, life cycle management and the potential future increase in demand, it was concluded the only solution that meet the project requirements was the STP and Land Application system proposed by True Water Australia.

Operational security was a key consideration and it was agreed the supply of a scalable 40kL Kubota sewage treatment plant discharging to a mound system provided the highest level of reliability and operational security, as well as the best amenity and aesthetic outcome.

True Water Australia was then engaged to undertake consultancy, manage regulatory application and approvals, complete project delivery, commissioning and provide ongoing project management.

Reference

SCOTT pdi
PROPERTY DEVELOPMENT INVESTMENT

Commercial Asset Management Services Pty Ltd
ABN 88 009 967 275
Email mail@camspl.com
Telephone +61 7 5537 8544
Facsimile +61 7 5537 9522
Address P.O. Box 520 Runaway Bay
Queensland 4216 Australia

19th February 2018

To whom it may concern,

Scott PDI engaged True Water Australia to provide the new sewage treatment system for our Service Centre on the Pacific Highway south of the Gold Coast.

True Water stepped in to help engineers and environmental consultants with design challenges and played a key role in securing council approval. They undertook works in close coordination with Hutchinson's Builders to deliver the project on budget and on time.

At every stage the dealings with True Water have been professional. Their focus on achieving the best outcome for the project has given the service centre a system that can manage the challenges presented by fast food outlets, allows for increased usage in the future and has proven reliable during even the heaviest holiday usage.

Since opening the Service Centre, True Water have provided a range of services which have helped in the general operation of the site. From maintenance of the STP, lab testing and analysis of water, ongoing advice and education to commercial tenants and 24hour support, True Water have addressed every need.

At each stage, True Water have exceeded expectations and standards. Their involvement has provided ScottPDI with confidence that our treatment plant will operate to a high level well into the future.

Yours sincerely

Bernadette Hook
Property Manager

SCOTT pdi

Project Stakeholders

CALTEX
HUTCHINSON BUILDERS Established 1912
halgan pty ltd halgan.com.au
KFC
oliver's FEED YOUR GOOD
THE COFFEE CLUB

Chinderah Service Centre System Design and Approval

Council Reference: SEP15/0088 DA13/0469 LN:82268 GM
Your Reference:

TWEED SHIRE COUNCIL

22 December 2015

Customer Service | 1300 292 872 | (02) 6670 2400
tsc@tweed.nsw.gov.au
www.tweed.nsw.gov.au
Fax (02) 6670 2429
PO Box 816
Murwillumbah NSW 2484
Please address all communications to the General Manager
ABN: 90 178 732 496

Hutchinson Builders
8 Prescott Street
TOOWOOMBA QLD 4352

Dear Sir/Madam

Approval to Install an On-site Sewage Management System under Section 68(1) Local Government Act 1993

Install on-site sewage management system for highway service

Application No	**SEP15/0088**
Owner	**CHINDERAH SERVICE-CENTRE INVESTMENTS PTY LTD 6 Cockleshell Court RUNAWAY BAY QLD 4216**
Property	**Lot 112 DP 1208904; No. 9402 Tweed Valley Way CHINDERAH**

Approval to Install an On-site Sewage Management System comprising the following components is given subject to compliance with the following conditions or to the satisfaction of the General Manager or his Delegate:

CONDITIONS:

Inspections required at installation:

The following inspections must be completed by Council at installation stage and Council must be given 24 hours notice prior to the inspections:

i. Installation of the wastewater treatment system including collection tanks;
ii. Installation of the effluent land application area;
iii. External drainage prior to backfilling;
iv. Completion of work.

Component list for wastewater treatment device:

One (1) commercial on-site sewage management system (Kubota K-HC 40kL or equivalent) to the satisfaction of the General Manager or Delegate.

Components List for Winsconsin Mound System:

The effluent land application area shall comprise **a minimum of 4 sand mounds each 61m x 9m x 0.9m high** installed and constructed in accordance with **HMC addendum on-site sewage management report 2013.02 dated September 2015 and Truewater Australia design plan JM915/HB3 dated 21/09/15 or to the satisfaction of the General Manager or delegate.**

Chinderah Service Centre Sewage Treatment Plant

The Sewage Treatment Plant selected for the Chinderah Service Centre is a 40kL Kubota K-HC-T STP with capacity for expansion to 100kL.

The STP site plan and system configuration are provided in *Figures 7* and *8* respectively.

Treatment Design and Process

Influent Flow

Influent flow	40m^3/day	General Influent time	12 hours
Peak flow factor	4		

Specifications

Treatment Method: Moving Media Bed process

Moving Bed Media – Polyethylene skeleton type (28mmØ x28mmH)

Structure and Material: STP Body – Fibre Reinforced Plastic (FRP)

Aeration Blower – Rotary Vein (3phase 415V, 50Hz)

Aeration Strength (Moving Bed Chamber) – 1.6m^3/m^3/hr

Airlines – Stainless and UPVC

Piping – Stainless and UPVC

Process Flow Diagram

Figures 7 and 8 detail the treatment process employed within the Kubota STP.

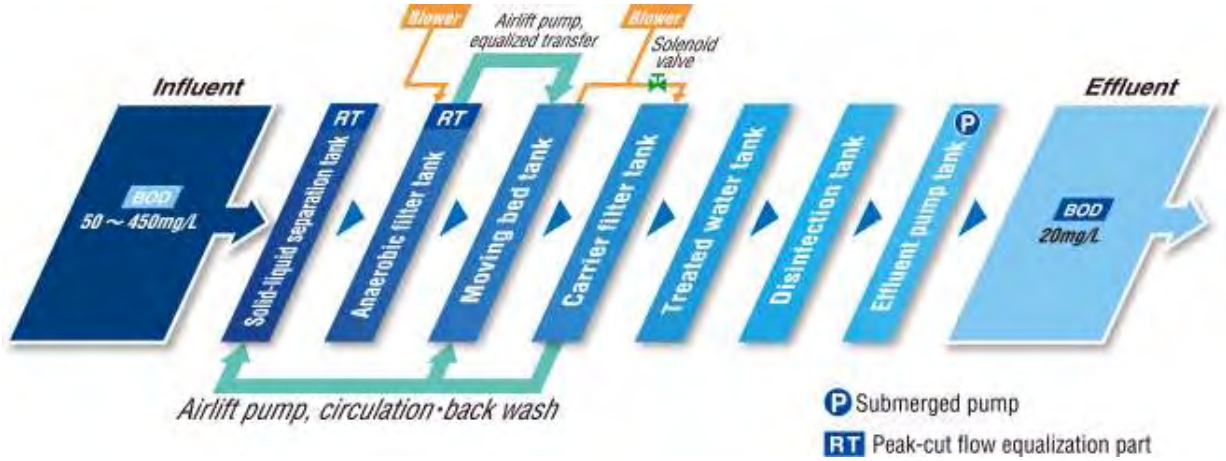


Figure 7 – Kubota K-HC-T Treatment Process Flow

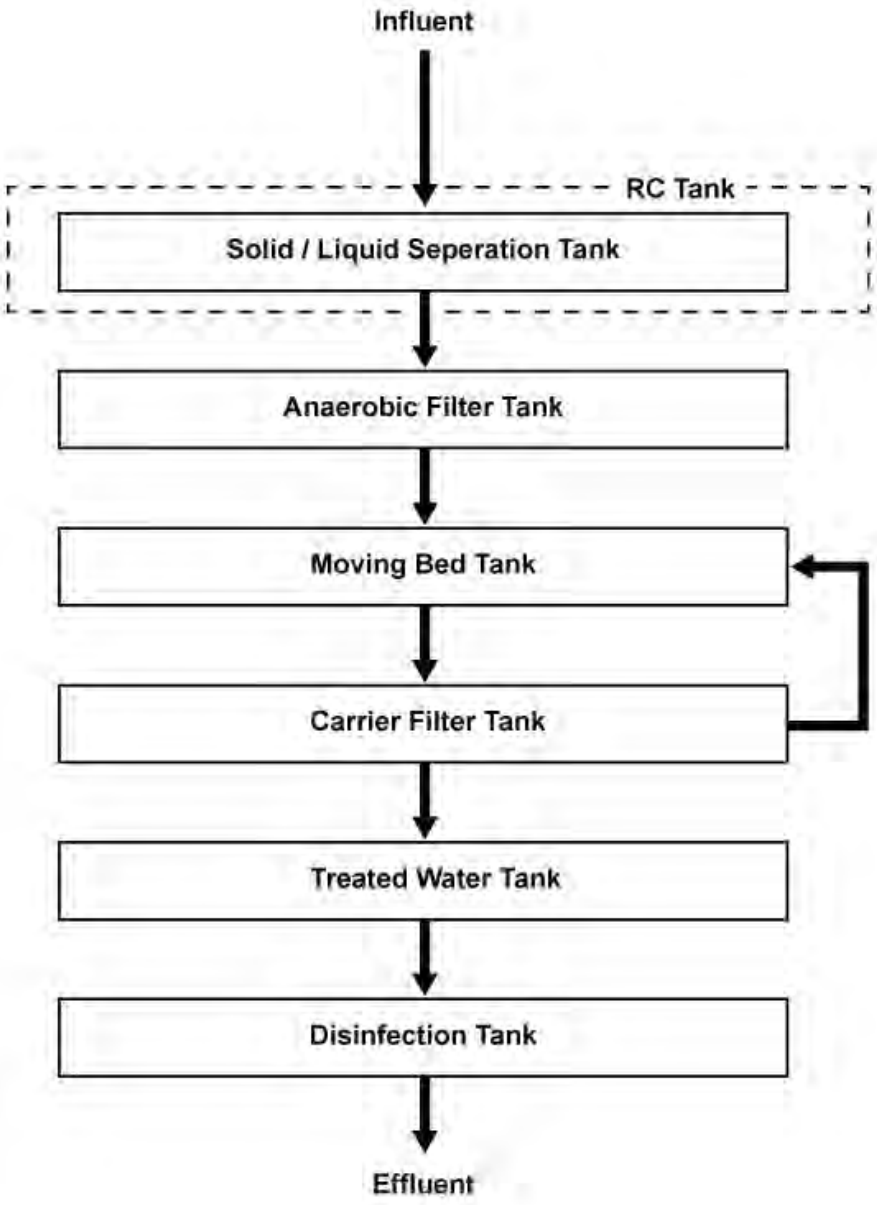


Figure 8 – Treatment Process – Kubota K-HC-T STP

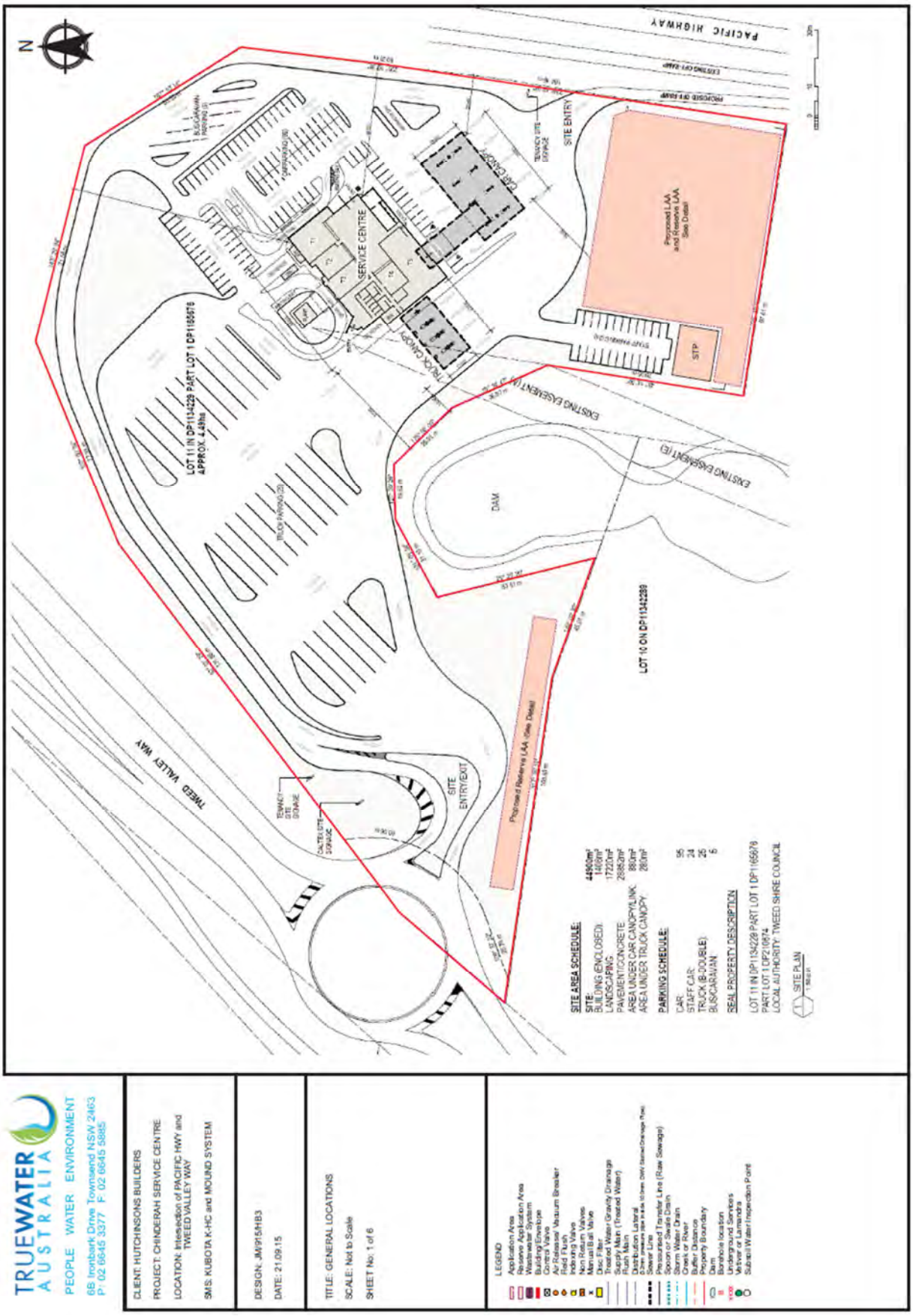


Figure 9 – STP Site Plan – Chinderah Service Centre

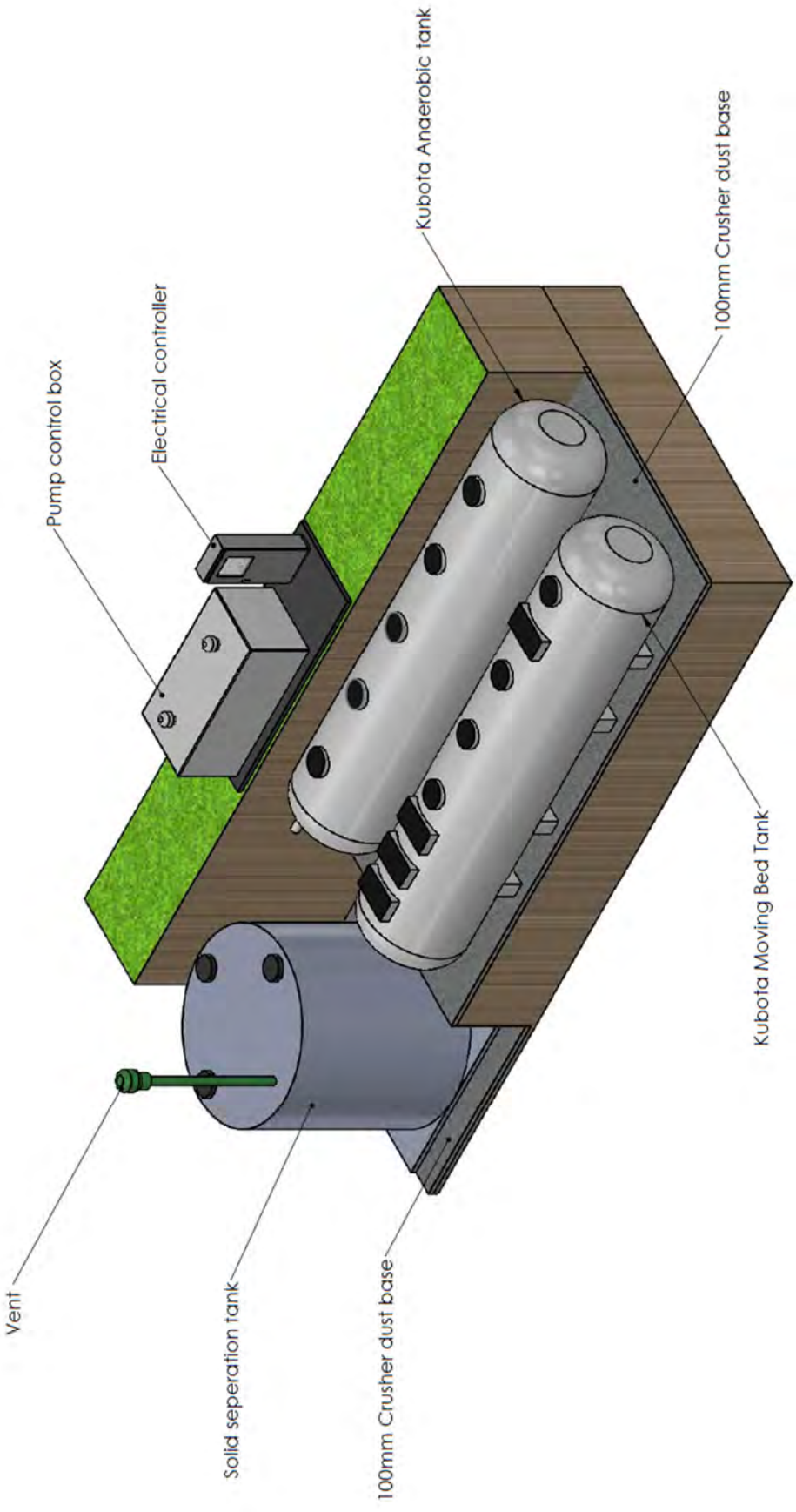


Figure 10 – 3D System Layout – Chinderah Service Centre

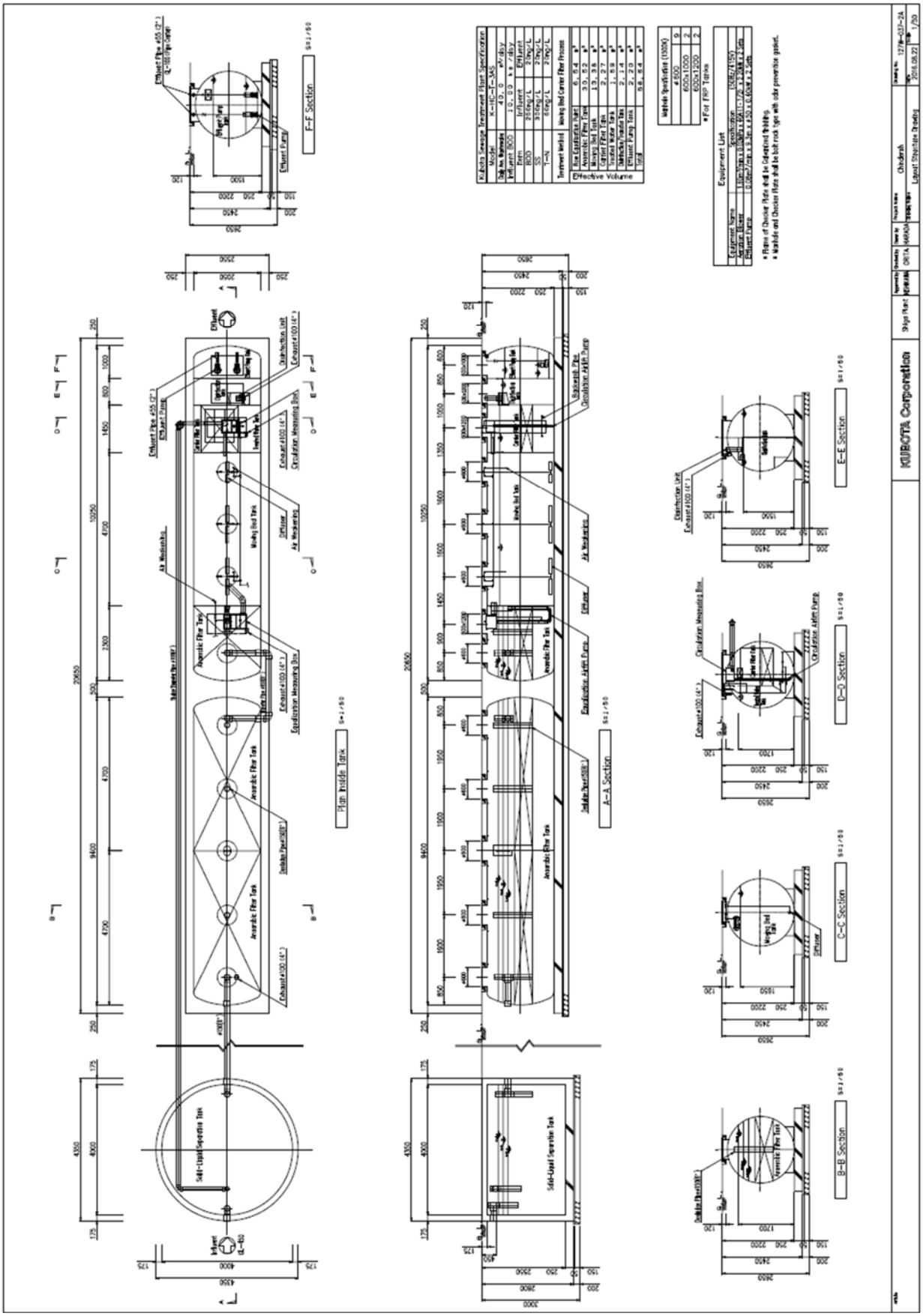


Figure 11 – STP Schematic – Chinderah Service Centre

Land Application – Mound

Treated water from the STP is stored in an Irrigation Tank. A dual pump set transfers treated water to a 2400m^2 Mound system located near the front of the development. All water is discharged underground ensuring there is no odour. Mounds require 1/8th the area of irrigation for water discharge and can be expanded as required. The mounds are mown regularly and provide simple, safe and low cost discharge of treated water.

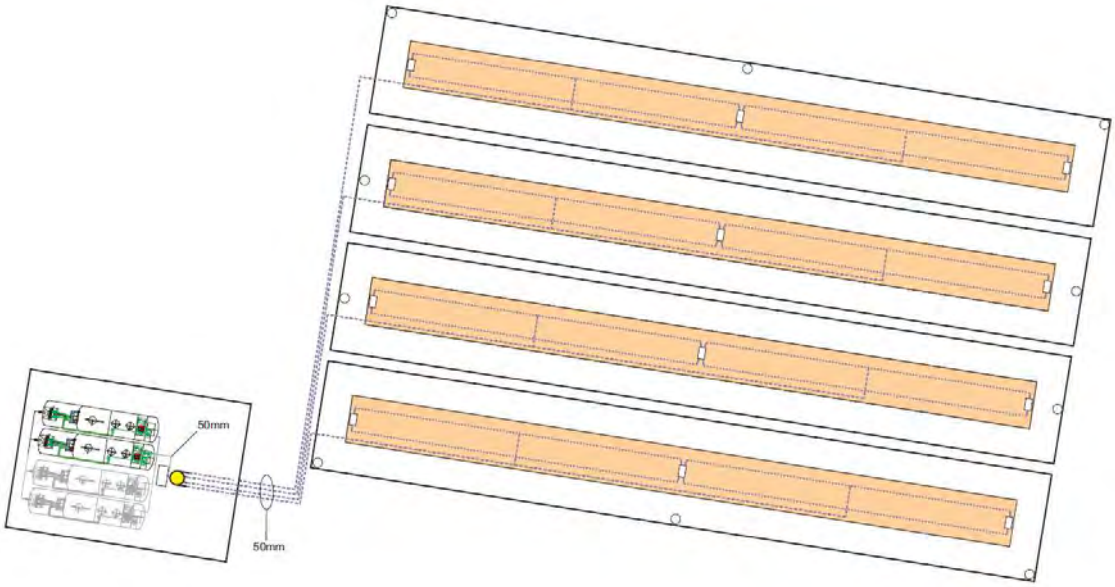
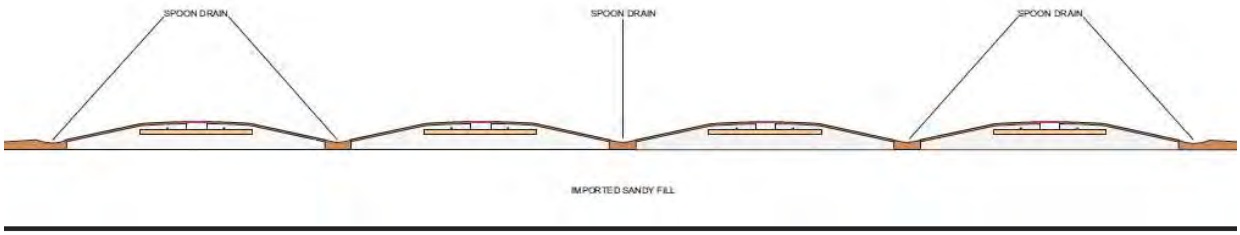


Figure 12 – Chinderah Service Centre Mound Area



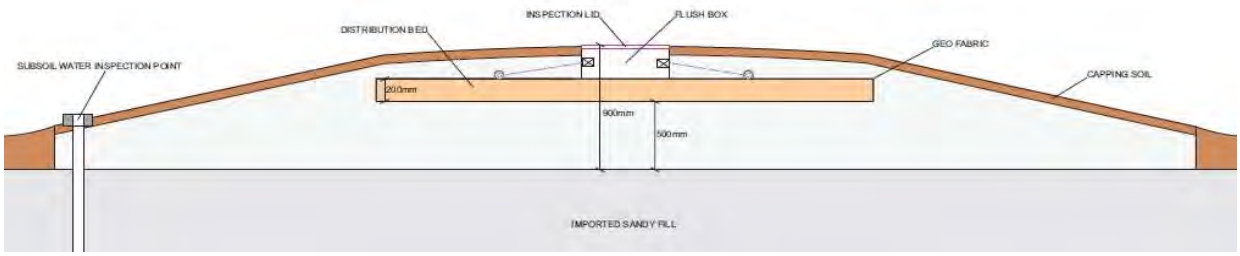


Figure 13 – Chinderah Service Centre Mound Cross-section

Infrastructure Delivery

Detailed Design - Duration: 6 weeks

Detailed design and system configuration is completed for each STP to ensure the STP is suited to project specific requirements. For the Chinderah project third party consultants had been engaged and had completed an undersized and inappropriate design which consisted of an undersized and unscalable 18kL above ground STP located within 5meters of the drive through entry to McDonalds and KFC. The initial system design had to be changed but had already been submitted to regulators. To keep the project on track True Water worked closely with council, client and builder to achieve approval within 8weeks.

Manufacturing and Fabrication - Duration: 12 weeks

The STP was manufactured to specifications by Kubota. True Water fabricate and assemble all additional componentry including STP controller, telemetry, airlines, transfer piping, pump sets and odour control units prior to dispatch to site. Manufacture and assembly was complete adhering to strict quality assurance processes and minimises risks associated with onsite assembly.

Installation - Duration: 2 weeks

Due to in factory manufacture and assembly, installation is completed promptly and efficiently. The STP is installed below ground to eliminate visual and odour impacts, minimise temperature fluctuations and reduce deterioration caused by exposure to weather. Photographs of the Chinderah Service Centre installation are provided below.

Testing, Commissioning and Handover - Duration: 1 week

Testing, commissioning and handover occurred once the system commenced operation. The process included quality assurance assessment of installation, testing of componentry and redundancies, and NATA laboratory testing of treated water.

Installation Photos


AUSTRALIAN TANKS

Sewage Treatment Plant Overview

Collection

Sewage and wastewater are collected from the service centre within a gravity drainage network which discharges to a series of grease arrestors.

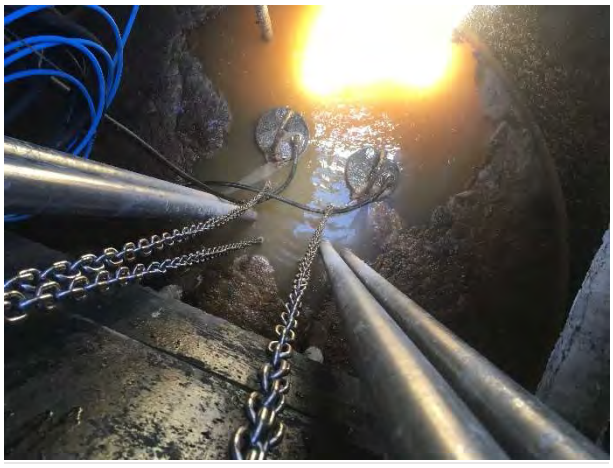
Pre-Treatment

Influent from each individual tenancy passes through its own Halgan Grease Arrestor prior to entering a Sewage Pump Well.

The Grease trap is to be strictly maintained in accordance with the site management plan, preventing grease and oil from entering the Treatment Plant. Maintenance and pump out of the grease arrestors is managed by the property manager.

Sewage Pump Well

A 10kL sewage pump well is located at the rear of the service centre. All waste from the grease arrestors and other drainage systems discharge to the pump well which is sealed to prevent odour. Two grinder pumps are located within the sewage pump well and transfer all sewage from rear of the service centre to the STP.



Solid Liquid Separation Tank

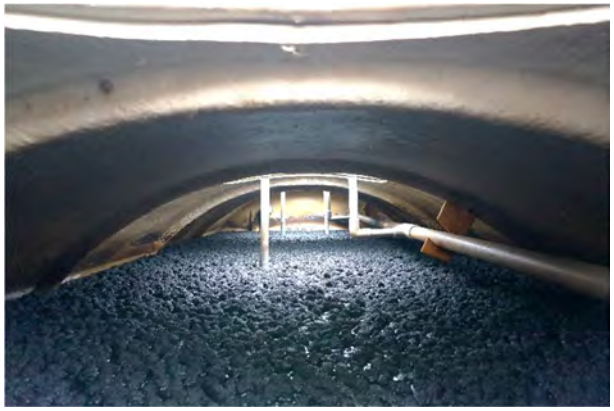
The Solid Liquid Separation Tank is a reinforced Concrete 20kL chamber which collects all influent entering the STP. Solids are separated during a settling process. The chamber is sealed gas tight, then is vented with a charcoal filter to prevent odour.

Anaerobic Filter Chamber

The anaerobic filter chamber is aerated via timer at 30minute intervals using a mixing blower. Water moves though this chamber and is transferred via gravity flow to the Aerobic Media Chamber.

Aerobic Media Chamber (Moving Bed)

Wastewater flows from the Mixing Box to the Aerobic Media Chamber. Access to this chamber is via three inspection openings. The chamber contains cylindrical Polyethylene skeleton type media cubes which provide filtration of wastewater.



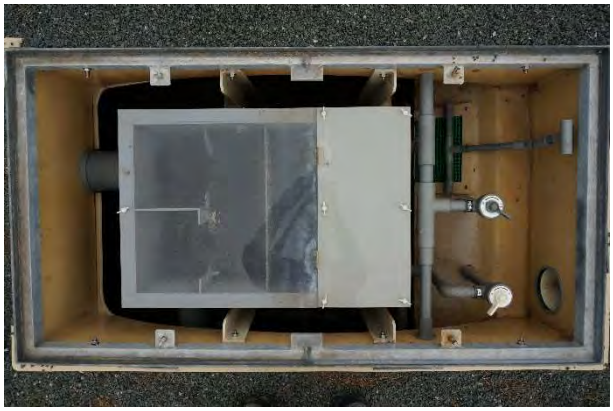
Circulation Chamber

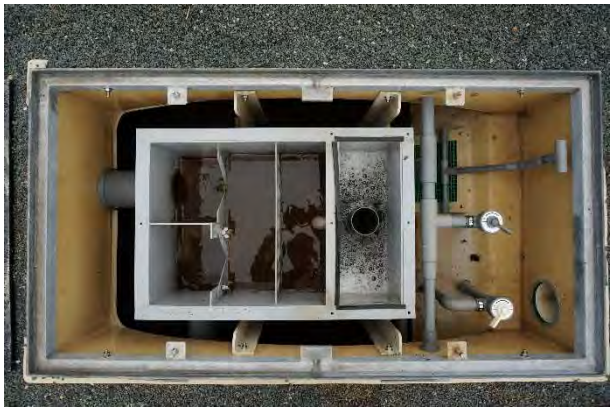
The Circulation Chamber provides a continuous circulation of wastewater back to the solid separation tank. Recirculation automatically adjusts to suit incoming flows. This chamber includes a suction tube used to collect floating objects and return them to the Sludge Tank.

Carrier Filter Chamber

The Carrier Filter Chamber contains caged media in the centre of the chamber. Water must pass through this small media as it flows through to the next chamber for disinfection.

The Carrier Filter Chamber is aerated each night between 12am and 2am to degas media.





Treated Water Chamber

Water passes through a chlorine contact chamber eliminating any residual pathogens as it enters the Treated Water Chamber.

Treated water flows to the Irrigation Tank for transfer to land application.

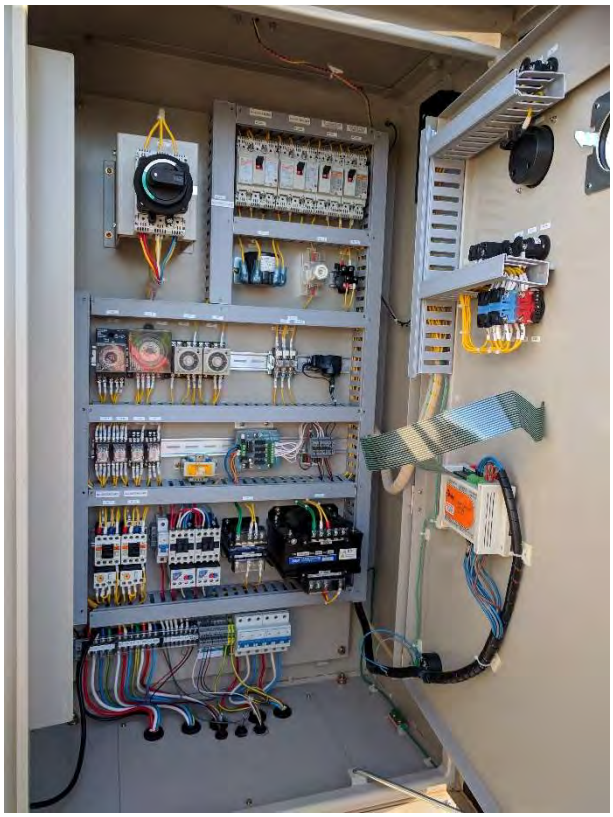
Treated Water Chamber

The Treated Water Chamber is the final chamber in the Kubota Treatment plant. It is stores treated water prior to discharge via the mound system.

STP Components

Control Panel

The control panel used is manufactured by Mitsubishi in Japan. The control panel is user friendly, incorporating a simple touchpad connected to the PLC, and monitors all operation and faults for the STP.



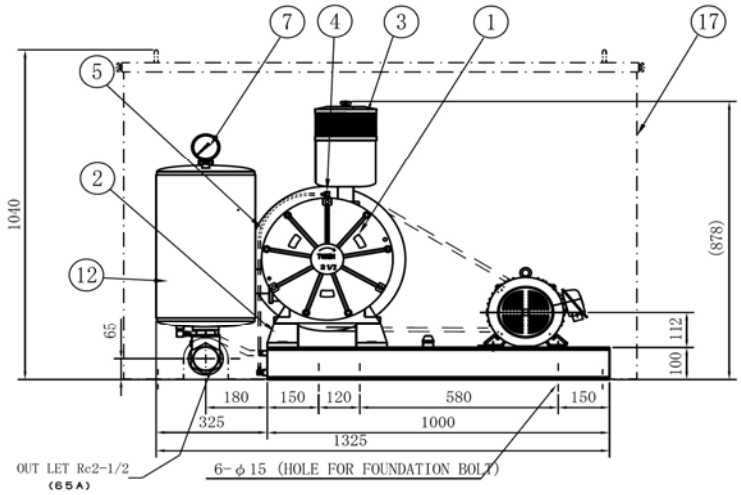
Telemetry

The STP includes real time monitoring through the integration of a 3G telemetry module.

The telemetry module reports operation, alarms and faults as they occur. Data collected by the module may also include operation of blowers, pump, power, backwash flows and daily flow information.

Blowers

The STP uses two Tohin, rotary vein oil lubricated blowers, in a duty standby configuration, for aeration and air lift. The blowers are specified due to there low operating cost, simplicity and longevity. The blowers are housed within a powder coated aluminium housing to stop noise and allow easy access.



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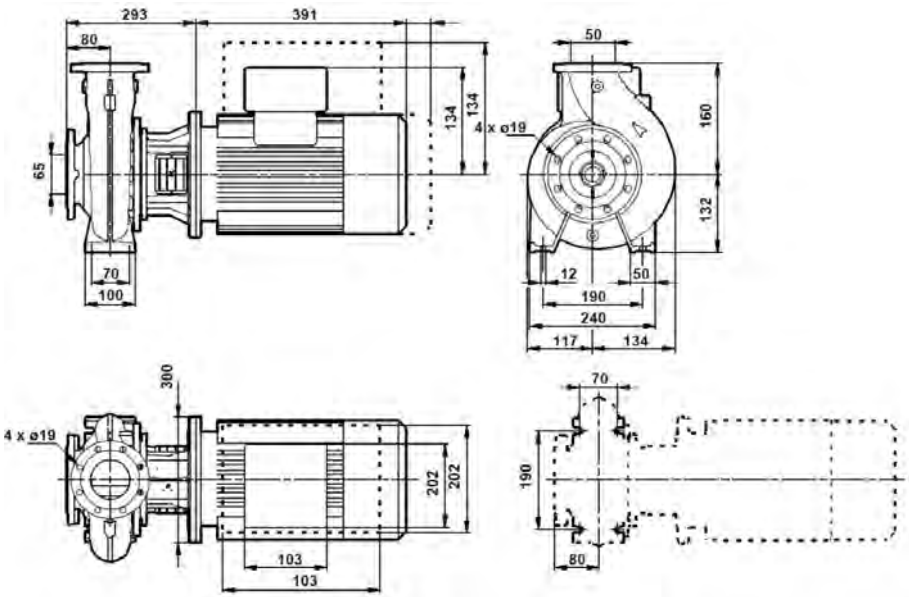
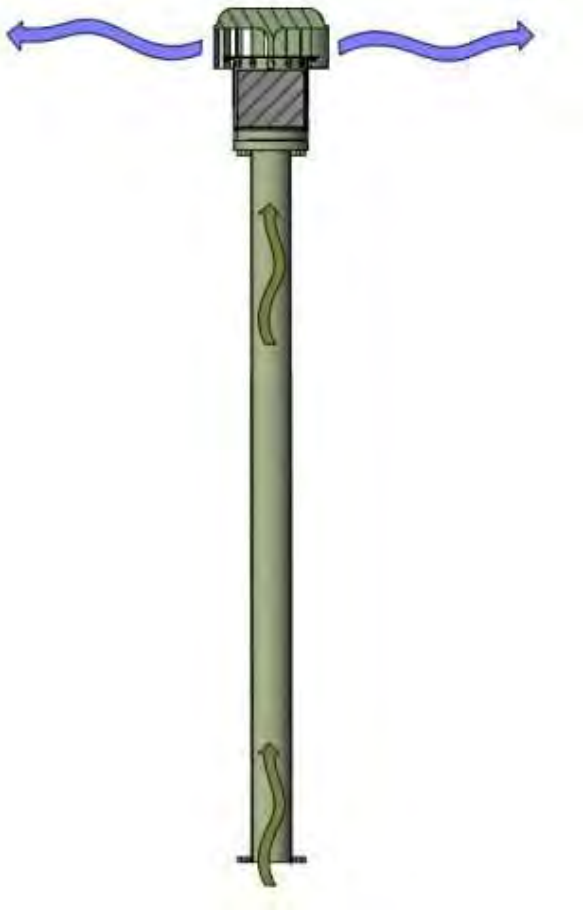
Irrigation Pumps

The STP utilises Grundfos centrifugal pumps in a duty/standby configuration. The dual pump controller alternates between each pump for even wear. The irrigation pumps transfer treated water from the Irrigation Tank to the storage lagoons.



Odour Control

The Kubota STP is a gas tight system preventing any potential for escape of odour. The reinforced concrete solid/liquid separation tank has an odour filtration and vent device fitted to further ensure no odour is released during the treatment process.



About Kubota

- Established in 1890
- Kubota operate throughout North America, Europe, Asia, Oceania and Australia
- Consolidated sales of $14.4Billion USD in 2015
- Currently employees more than 35,000 people
- Business activity sectors include:
    - Engineering
    - Agricultural Machinery
    - Engines
    - Wastewater
    - Water
    - Environmental
    - Pipes
    - Pumps
    - Valves

Flagship Projects

Kubota Johkasou sewage treatment plants service the following projects:

Palm Jumeirah Island – Dubai

18,000kL per day Kubota Sewage Treatment Plant

Narita Airport – Tokyo

1,500kL per day Kubota Sewage Treatment Plant

Case Studies – Similar STP's

Central Wastewater Treatment Facility

Name of site	Central Wastewater Treatment Facility					
Location	Japan					
Wastewater type	General Wastewater					
Treatment method	Membrane Bioreactor (MBR)					
Flow rate	267m^3/day					
Water quality	Influent (mg/l)	BOD	500	Effluent (mg/l)	BOD	≦1
		SS	180		SS	≦1
		T-N	21		T-N	≦0.3

Image 1: Installation of Advanced Sewage Treatment Plant

Image 2: Installation of Advanced Sewage Treatment Plant

Image 3: Tank Configuration for Sewage Treatment Plant

Image 4: Finished Project

Central Wastewater Treatment Plant for rural area

Name of site	Central Wastewater Treatment Plant for rural area					
Location	Japan					
Wastewater type	General Wastewater					
Treatment method	Membrane Bioreactor (MBR)					
Flow rate	160m^3/day					
Water quality	Influent (mg/l)	BOD	500	Effluent (mg/l)	BOD	≦1
		SS	180		SS	≦1
		T-N	21		T-N	≦0.3

Image 1: Installation of Advanced Sewage Treatment Plant

Image 2: Finished Project

Honda Production Facility Japan

Name of site	Honda Production Facility - Japan					
Location	Japan					
Wastewater type	General Wastewater					
Treatment method	Membrane Bioreactor (MBR)					
Flow rate	220m^3/day					
Water quality	Influent (mg/l)	BOD	500	Effluent (mg/l)	BOD	≦1
		SS	180		SS	≦1
		T-N	21		T-N	≦0.3

Image 1: Completed Installation of Treatment Tanks

Image 2: Finished Project

Community Sewage Treatment Plant

Name of site	Sewage Treatment Plant					
Location	Japan					
Waste water type	Community wastewater					
Treatment method	Moving Bed					
Flow rate	62m3/day					
Water quality	Influent (mg/l)	BOD	200	Effluent (mg/l)	BOD	≦20
		SS	160		SS	≦20
		T-N	-		T-N	-

Image 1: Installation of Wastewater Tanks

Image 2: Installation of Wastewater Tanks Continued

Community Sewage Treatment Plant

Name of site	Sewage Treatment Plant					
Location	Japan					
Waste water type	Community wastewater					
Treatment method	Moving Bed					
Flow rate	56m3/day					
Water quality	Influent (mg/l)	BOD	200	Effluent (mg/l)	BOD	≦20
		SS	160		SS	≦20
		T-N	-		T-N	-

Image 1: Installation of Wastewater Tanks

Image 2: Configuration of Wastewater Tanks

Image 3: Completed Installation of Wastewater Tanks

Image 4: Control Boxes for Wastewater Tanks

Cho Ray Hospital

Name of site	Cho Ray Hospital					
Location	Vietnam					
Wastewater type	Domestic wastewater					
Treatment method	Moving Bed					
Flow rate	1,150m^3/day					
Water quality	Influent (mg/l)	BOD	200	Effluent (mg/l)	BOD	≦20
		SS	200		SS	≦50
		T-N	40		T-N	≦30

Image 1: Installation of Advanced Sewage Treatment Plant

Image 2: Completion of Installation

Petro Rabigh

Name of site	Petro Rabigh					
Location	Saudi Arabia					
Wastewater type	Sanitary treatment plant for refinery plant					
Treatment method	Membrane Bioreactor (MBR)					
Flow rate	530m^3/day					
Water quality	Influent (mg/l)	BOD	300	Effluent (mg/l)	BOD	≦10
		SS	350		SS	≦10
		NH4-N	50		NH4-N	≦5
		T - N	60		NO3-N	≦10

Image 1: Installation of Advanced Sewage Treatment Plant

Image 2: Completed Installation of Sewage Tanks

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