CONSTRUCTION COMPLIANCE REPORT

REDCLIFFE PROJECT

W6650/2022/1

12th March 2025

Version 1

Document Control

Version	Date	Author	Reviewer	Approved
1.0	12 March 2025	[redacted] Genesis Minerals – Environmental Advisor	Genesis Mineral – Environmental Supt.	Genesis Mineral – Environmental Supt.

Genesis Minerals Limited | ABN 72 124 772 041

Level 7, 40 The Esplanade, Perth WA 6000 | PO Box Z5024, Cloisters Square WA 6850 | Australia

Tel +61 (0)8 6323 9050

www.genesisminerals.com.au

CONTENTS

Tables

Figures

1. INTRODUCTION

This Environmental Compliance Report has been prepared by Genesis Minerals Limited to satisfy Condition 2 of Works Approval W6650/2022/1 (the **Works Approval**) and the requirements therein associated with the installation of the following infrastructure:

- Item 6: Truck Washdown Facility

1.1 PRESCRIBED PREMISES CATEGORY

Infrastructure in this CCR is associated with the following Prescribed Premise Categories (Table 1).

Table 1: Prescribed Premises Category

Prescribed Premises Category	Assessed production / throughput capacity.
Category 6: Mine Dewatering	471,500 tonnes per annual period

1.2 CONSTRUCTION AND INSTALLATION REQUIREMENTS

This report demonstrates compliance with the construction and installation requirements of the following infrastructure:

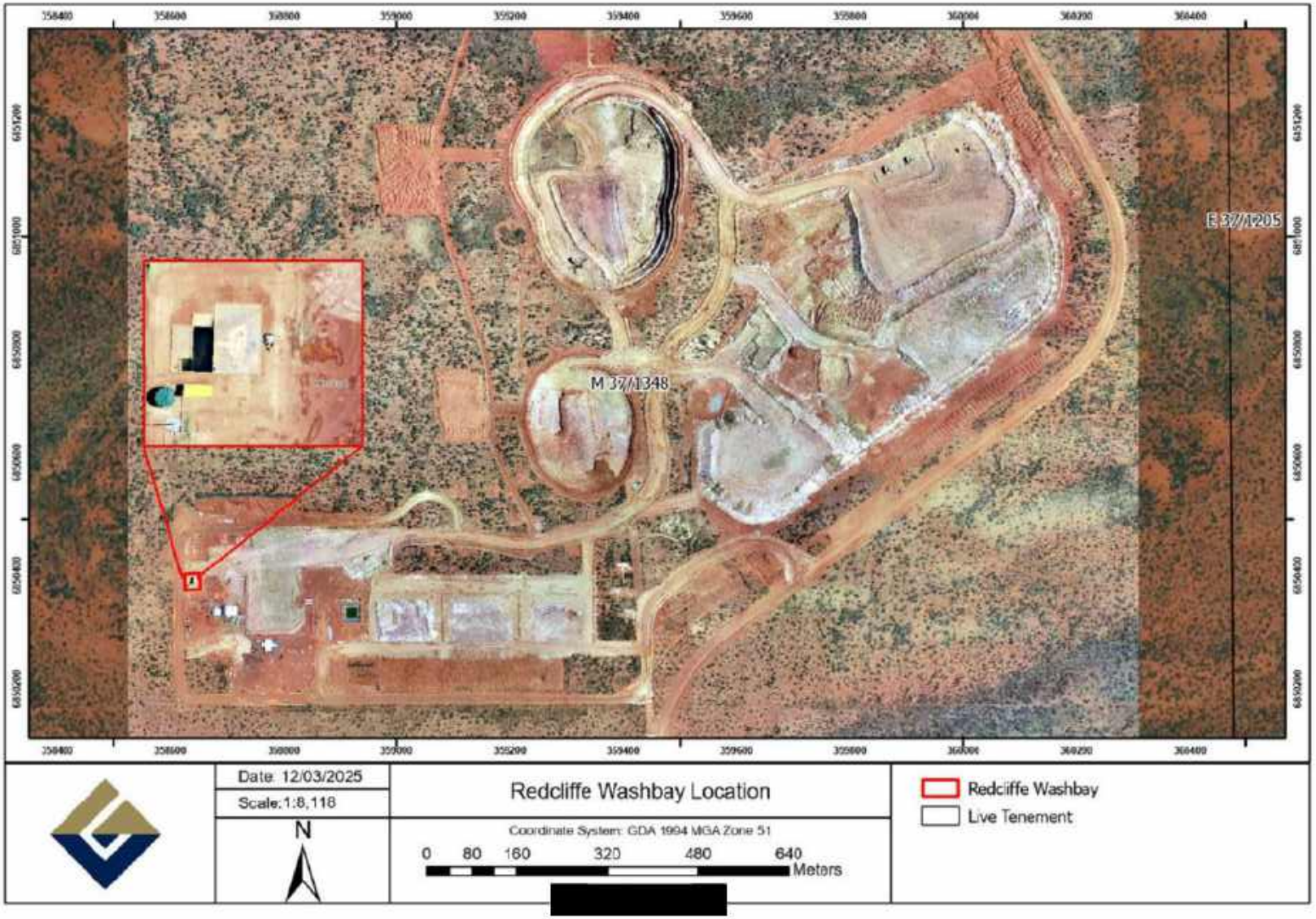
- Item 6: Truck Washdown Facility

Table 2: Construction and installation requirements (W6650/2022/1; LC1, Table 1).

Item	Infrastructure and / or equipment	Design and construction / installation requirements	Infrastructure Location	Construction Completion Date
6	Truck washdown facility	(a) Facility designed so all washdown water is captured and prevented from being released into the environment. (b) Installation of the oily water treatment system is completed as required by the manufacture's specifications; and (c) Oily water treatment system must be capable of treating the washdown water to <15 mg/L total petroleum hydrocarbons.	Truck washdown facility located as shown in Figure 1.	10/03/2025

2. CONSTRUCTION TO REQUIREMENTS EVIDENCE

2.1 FIGURE 1 - WASHDOWN FACILITY SITING



2.2 DESIGN

Table indicates the design requirements and evidence supporting the design to specifications.

Table 3: Design Requirements for Truck Washdown Facility

Design Requirement	Summary	Evidence
a) Facility designed so all washdown water is captured and prevented from being released into the environment.	Both the HV and LV washbays are constructed on concreted bunded pads, with washdown water directed into the adjacent sump and collection pit. From the collection pit, the washdown water is skimmed and processed through the oily water separator before being stored in the 50kL washdown tank. The workshop sump water is transported to the collection pit via the workshop sump line.	Finalised infrastructure as shown in Appendix 1. Water network schematic as shown in Appendix 3.
b) Installation of the oily water treatment system is completed as required by the manufacturers specifications; and	Installation of the oily water treatment system was completed by certified engineers as per the manufacturers specifications.	The signed memo within Appendix 4 shows construction as per the installation and operation manual of Appendix 5.
c) Oily water treatment system must be capable of treating the washdown water to <15 mg/L total petroleum hydrocarbons.	The Ultraspin Separator was chosen due to its increased power capabilities and centrifugal forces. Monthly monitoring and NATA accredited lab analysis will be conducted to ensure compliance with design requirements.	Appendix 5 operations manual highlights the specifications of the Ultraspin Separator.

3. COMPLIANCE SUMMARY

A summary of compliance against works approval conditions relevant for the construction of infrastructure at the Redcliffe Gold Project is detailed in Table .

Table 4: Summary of compliance with relevant works approval condtions to this report.

Licence Condition Ref	Works Approval Condition	Compliance Status
LC1	*The works approval holder must construct and/or install the infrastructure and/or equipment;* *(a) in accordance with the corresponding design and construction / installation requirements; and* *(b) at the corresponding infrastructure location; as set out in Table 1.*	**Compliant** a) As evidenced in Table 3. b) Location presented in Figure 1 - siting not specified in Works Approval.
LC2	*The works approval holder must within 30 calendar days of an item of infrastructure or equipment required by condition 1 being constructed and/or installed:* *a) undertake an audit of their compliance with the requirements of condition 1; and* *(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.*	**Compliant** Facility construction was finalised on 10 March 2025. This Environmental Compliance Report (within 30 days of installation) represents the audit of compliance to condition 1.
LC3	*The works approval holder must ensure that the Environmental Compliance Report required by condition 2(b), includes as a minimum the following:* *(a) certification by a qualified civil or structural engineer that the items of infrastructure or component(s) thereof, as specified in condition 1, have been constructed in accordance with the relevant requirements specified in condition 1;* *(b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1;* *(c) a schematic diagram of the dewatering network that shows the elements of the dewatering network and how the network has been designed to incorporate movement of*	**Compliant** a) As evidenced in Table 3 and Appendix 4. b) As evidenced in Appendix 2. c) Is not applicable to Item 6. d) Is not applicable to Item 6. e) As evidenced in Appendix 1. f) As evidenced in the conclusion.

	dewater effluent between the mining voids, turkey's nests/dams and the final disposal point/s; *(d) photographs of each dewater effluent storage turkey's nests/dams and the pipelines that transport dewater effluent to and from the infrastructure;* *(e) photographs of the truck washdown facility oily water separator and the pipelines that transfer dewater to and from the infrastructure; and* *(f) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.*	

4. CONCLUSION

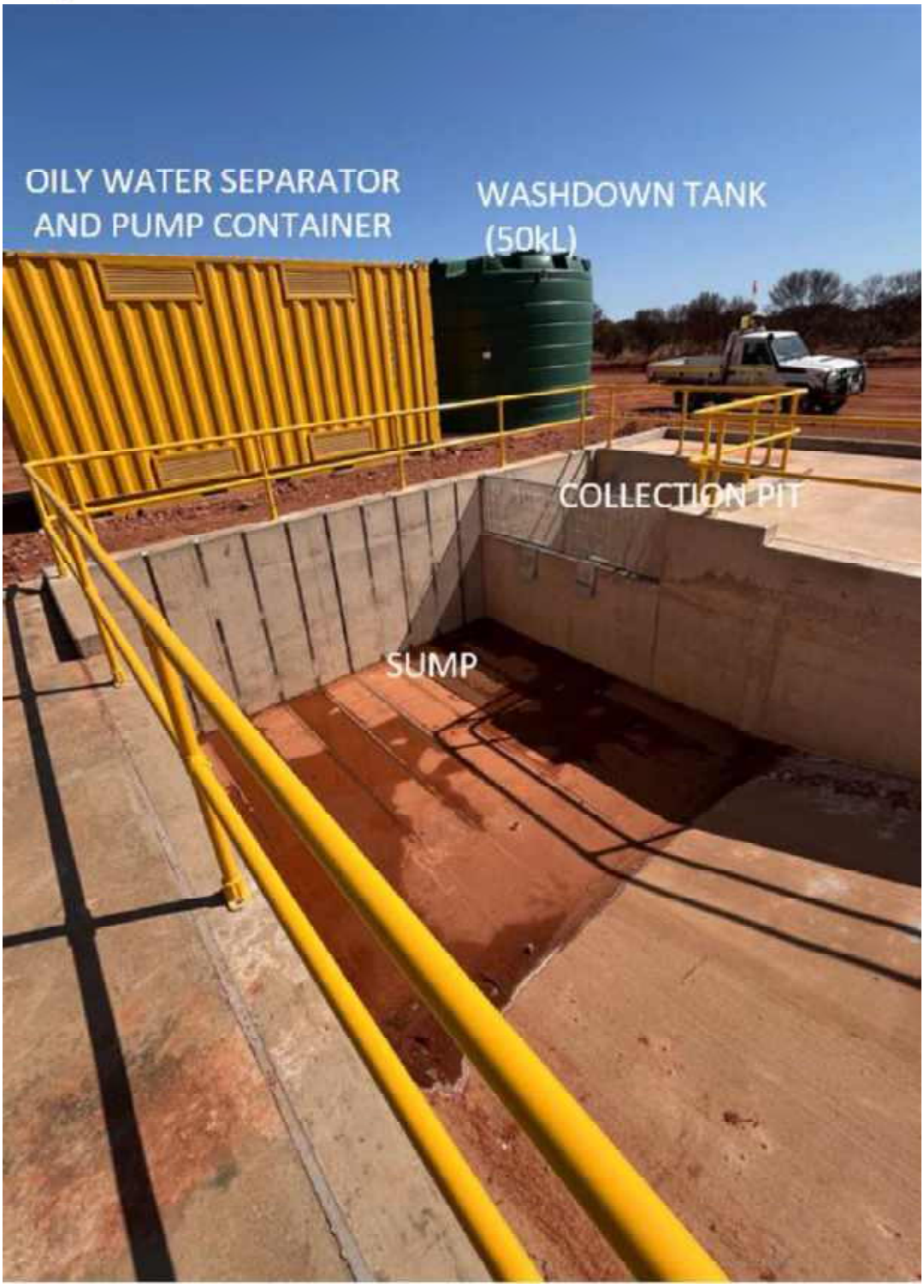
Genesis confirms that the construction and infrastructure of the Redcliffe Washdown Bay meet the requirements set out in LC 1, Table 1 for Item 6 of the Redcliffe Gold Project Works Approval.

Sincerely,

General Manager – Genesis Minerals Leonora Operations.

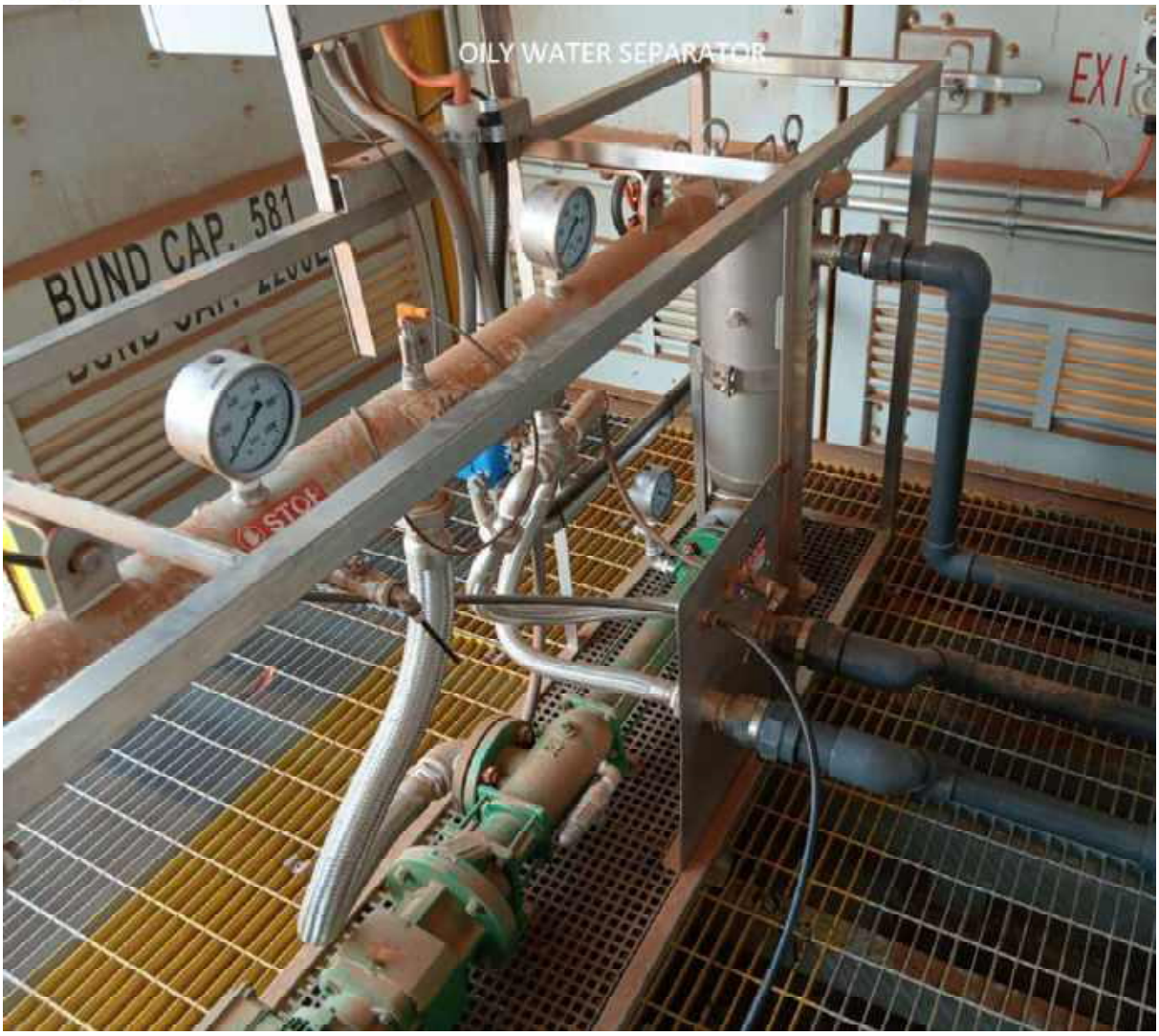
APPENDIX 1 – AS-BUILT COMPLETED INFRASTRUCTURE


OILY WATER SEPARATOR
OIL SEPARATION AND DECANT TANK
BUND CAP. 581 GAL
BUND CAP. 2200L

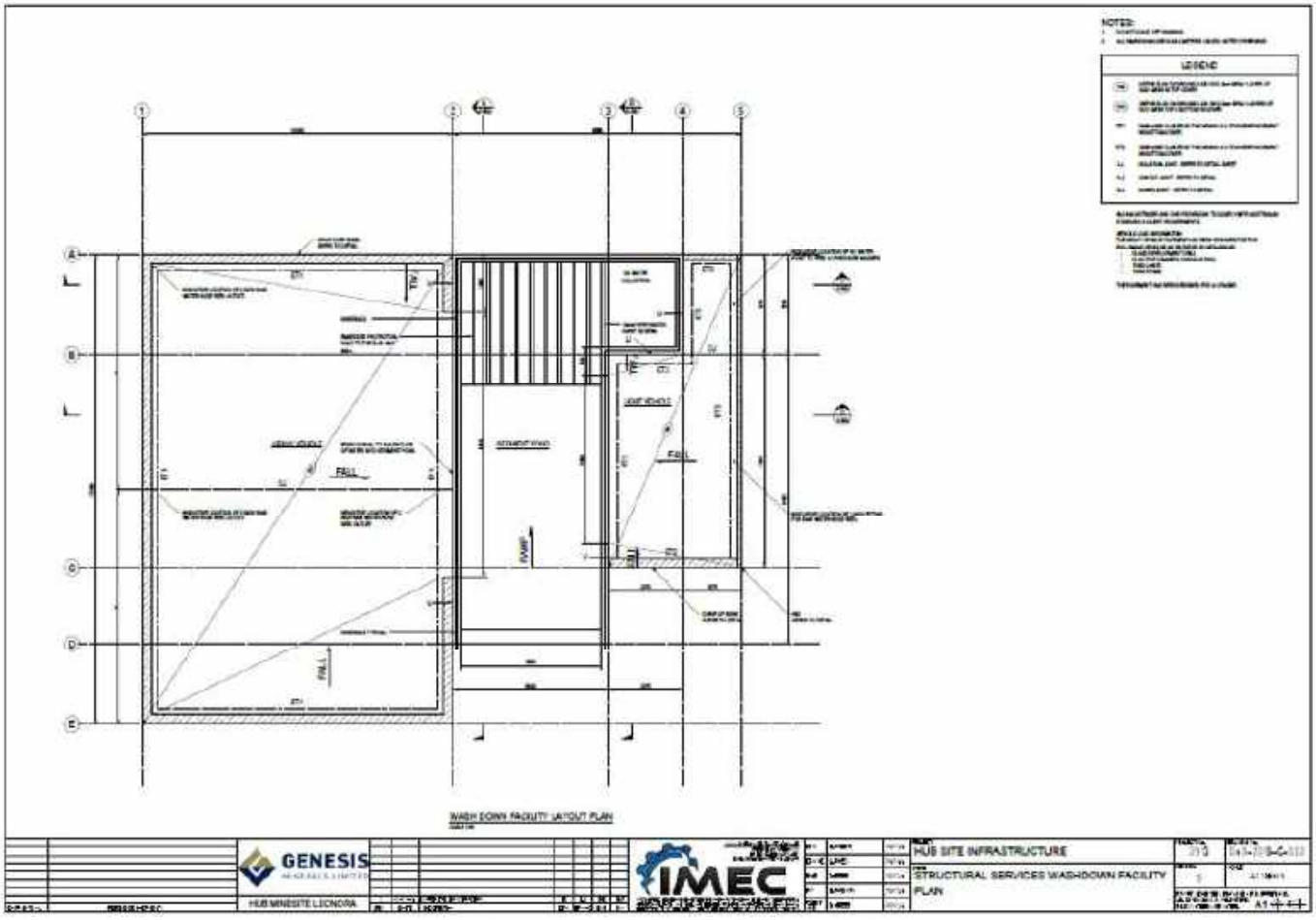

OILY WATER SEPARATOR
AND PUMP CONTAINER
WASHDOWN TANK
(50kL)
COLLECTION PIT
SUMP

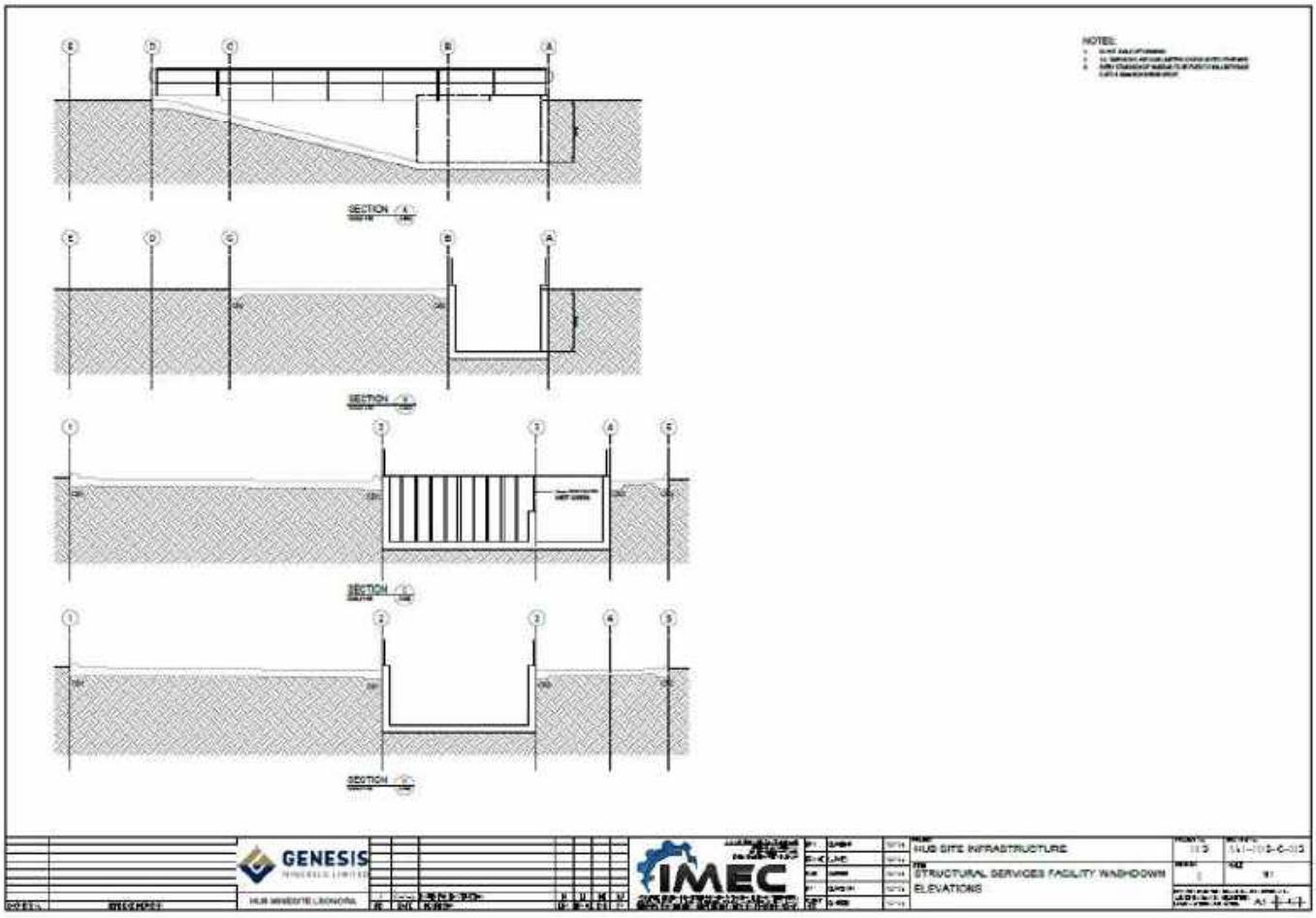

WASHDOWN PUMP
2200L


OILY WATER SEPARATOR
BUND CAP.


OILY WATER SEPARATOR
BUND CAP. 581

APPENDIX 2 – WASHDOWN BAYS DESIGN

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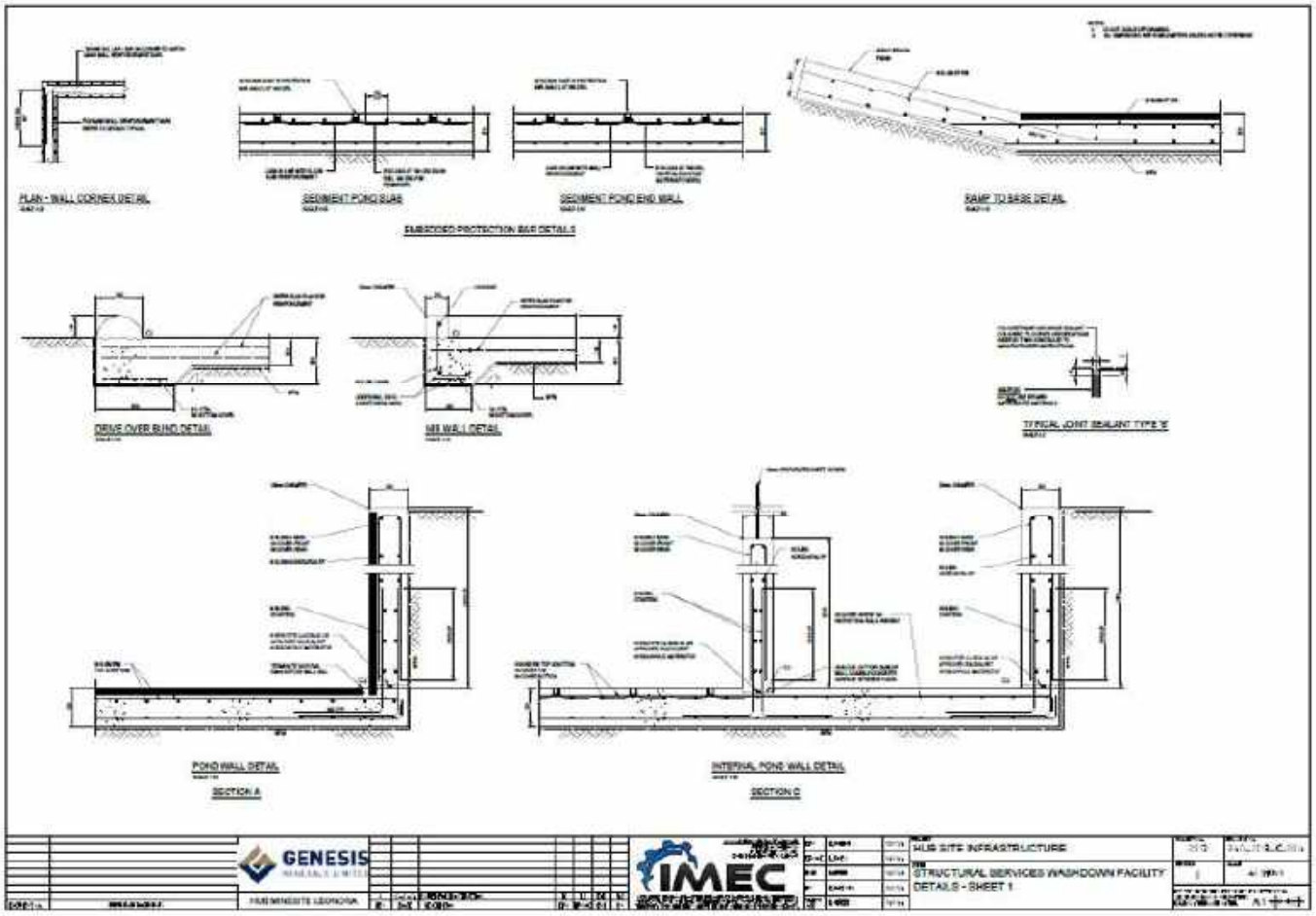
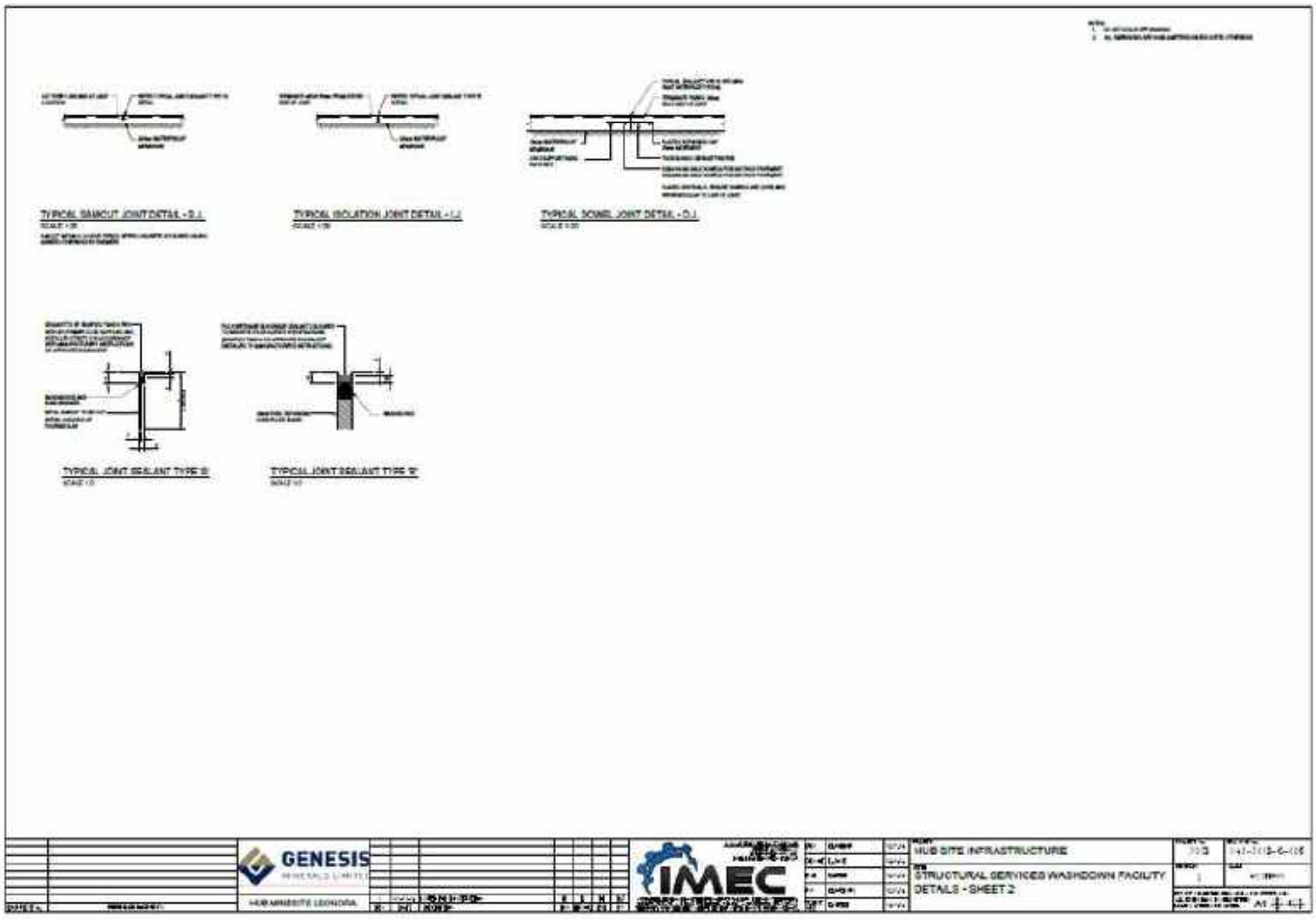
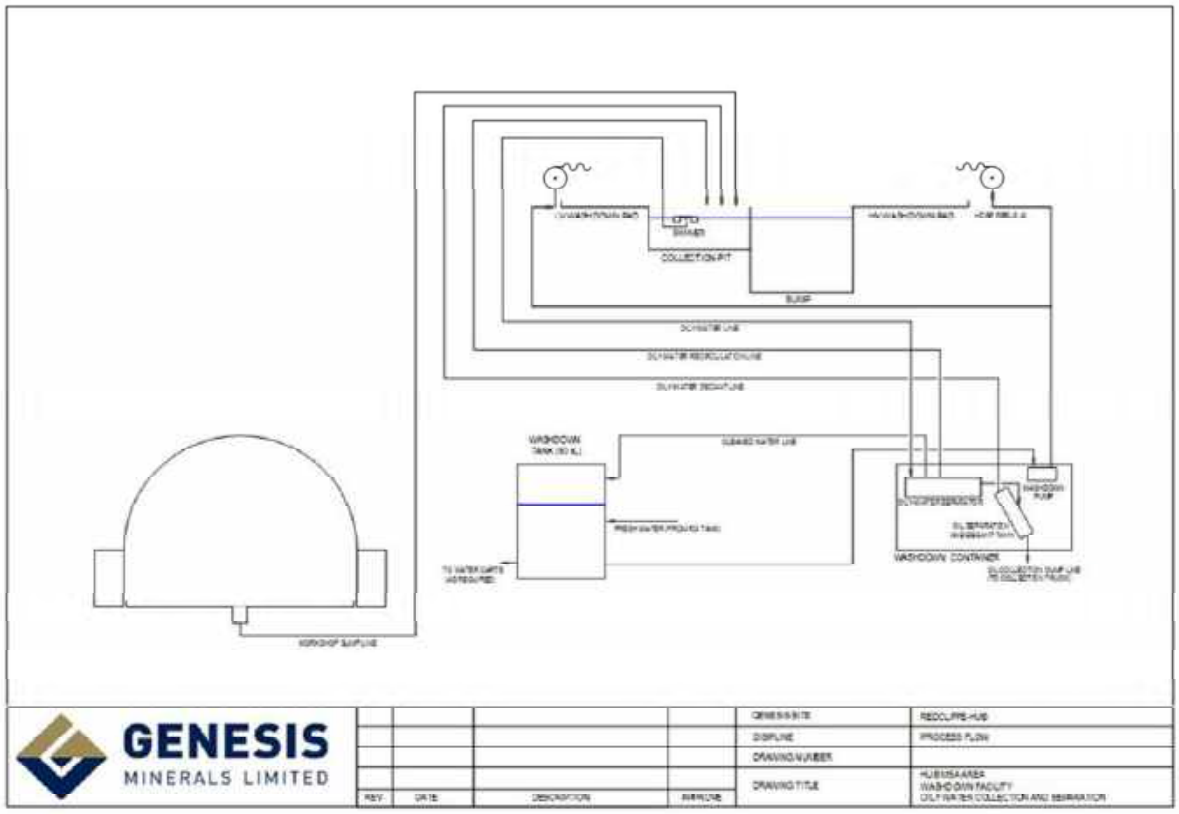
SECTION
SECTION
SECTION
SECTION
GENESIS
IMEC
HUB SITE INFRASTRUCTURE
STRUCTURAL SERVICES FACILITY WASHDOWN
ELEVATIONS


PLAN - WALL CORNER DETAIL
SEDIMENT POND SUMP
SEDIMENT POND END WALL
RAMP TO SUMP DETAIL
EMBEDDED PROTECTION BAR DETAILS
DRIVE OVER BUND DETAIL
NIB WALL DETAIL
TYPICAL JOINT SEALANT TYPE 'S'
POND WALL DETAIL
SECTION A
INTERNAL POND WALL DETAIL
SECTION C
GENESIS
IMEC
MLG SITE INFRASTRUCTURE
STRUCTURAL SERVICES WASHDOWN FACILITY
DETAILS - SHEET 1


TYPICAL SAWCUT JOINT DETAIL - S.J.
TYPICAL ISOLATION JOINT DETAIL - I.J.
TYPICAL DOWEL JOINT DETAIL - D.J.
TYPICAL JOINT SEALANT TYPE 'B'
TYPICAL JOINT SEALANT TYPE 'D'
GENESIS
IMEC
HUB SITE INFRASTRUCTURE
STRUCTURAL SERVICES WASHDOWN FACILITY
DETAILS - SHEET 2

APPENDIX 3 – WATER NETWORK SCHEMATIC



APPENDIX 4 – QUALIFIED ENGINEER MEMO

MEMORANDUM

GENESIS MINERALS LIMITED

[redacted]

Date: 10/03/2025

Subject: W6650/2022/1 Construction Compliance Report – Item (6) Truck Washdown Facility

The intent of this memo is to satisfy Condition 3a of Works Approval W6650/2022/1 for the construction of the Truck Washdown Facility (Condition 1, Table 1, Item 6), and support submission of the Construction Compliance Report to the Department of Water and Environmental Regulation (DWER).

Design and Construction / Installation Requirements

The Truck Washdown Facility has been constructed in accordance with the design requirements and in the location required by Condition 1, Table 1, Item 6 as summarised below (Table 1).

Table 1 Design and construction/installation requirements for W6650/2022/1

Item	Infrastructure and / or equipment	Design and construction / installation requirements	Infrastructure Location
6	Truck Washdown Facility	(a) Facility designed so all washdown water is captured and prevented from being released into the environment. (b) Installation of the oily water treatment system is completed as required by the manufacture's specifications; and (c) Oily water treatment system must be capable of treating the washdown water to <15 mg/L total petroleum hydrocarbons	Not Specified

The following information is included as appendices in the final environmental compliance report:

- Photos of infrastructure
- Water network schematic (Oily water separation and collection)
- Design drawings of the washdown bays and collection sump and pit
- UltraSpin Installation and Operation Manual (oily water separator and skimmer)

Further information is included in the construction compliance report.

Yours Sincerely,

David Greep
Senior Projects Engineer
Genesis Minerals Limited

APPENDIX 5 – OILY WATER SEPARATOR MANUAL

www.ultraspin.com.au
+61 3 8841 7200

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Ultraspin Oily Water Separators
Electric (Helical Rotor)

Models:

EC35-RB	EC35-MAN
EB35-RB	EB35-MAN
EC70-RB	EC70-MAN
EB70-RB	EB70-MAN

HD- Heavy Duty Range

Document Title	Ultraspin Standard IOM Manual – Oily Water Separators: Electric
Document Number	MAN005
Revision Number	C
Revision Date	03/09/2021
Supplier Name	Ultraspin Technology Pty. Ltd.

Table of Contents

Important Notes to Read Before Commencing Any Work

Safety	Before attempting to undertake installation, maintenance or repair work of any nature, the persons concerned should be alerted to the nature of the risks involved when working in a situation of a potentially hazardous nature. As it is not possible to cover every aspect of safety in a single article, care has been taken in preparation of the following notes, which should serve as a general guide to the most common situations likely to be encountered. It is necessary to point out that Ultraspin or any of its associates cannot accept responsibility for any form of personal injury, however caused. Therefore, every care should be taken to observe the normal rules of safety.
Approvals	The manual is intended as a guide only. If required, site-specific drawings, Council, Water, Electricity Authority and Government approval and professional advice shall be obtained prior to installing the equipment mentioned in this manual.
Warning	Certain instructions and advice carry this tag. This information should NOT be ignored or damage to equipment or personnel could result.
Warranty	The data is based on tests and experience which Ultraspin Technology Pty Ltd believe reliable and is supplied for information services only. Ultraspin Technology Pty Ltd disclaims any liability for damage or injury which results from the use of the enclosed data and nothing contained therein shall constitute a guarantee, warranty or representation (including free from patent liability) by Ultraspin Technology Pty Ltd with respect to the data, the product described, or its suitability for any specific purpose, even if that purpose is known to Ultraspin Technology Pty Ltd.
Patents	Ultraspin Technology Pty Ltd has patented features of the skimmer, hydrocyclone and processes covered in this literature. Processes or products in this manual should not be used without the prior written consent of Ultraspin Technology Pty Ltd.
Update	Data subject to correction and update without notice
Copyright	
Standards	This Ultraspin Separators are designed to comply with some or all of the following standards: NSW Land & Water Conservation, January 1997 Guidelines for the On-Site Treatment of Trade Waste Discharge to Sewer AS/NZS 4494:1998 Discharge of Commercial & Industrial Liquid Waste to Sewer – General Performance Requirements National Water Quality Management Guideline for Sewerage Systems, November 1998 A list of manufacturing standards is available on request.
Design	This manual is not a design guide. It does not provide a substitute for careful planning and a considered site design drawing prepared by qualified and experienced people. If there is any uncertainty with design the service of competent design engineers experienced in oily water and local requirements should be sought. If needed Ultraspin can provide a list of recommended designers.

Ultraspin Technology Contact Details

Company Name:	Ultraspin Technology Pty Ltd
ABN:	53 101 873 250
Address:	46 Wadhurst Drive, Boronia VIC 3155
Telephone:	+61 3 8841 7200
Email:	sales@ultraspin.com.au
LinkedIn:	www.linkedin.com/company/ultraspin-technology-pty-ltd
YouTube:	www.youtube.com/user/UltraspinTechnology

1 Principles of Operation

1.1 Separator

The Ultraspin separator treats water contaminated with oils, fats, grease, hydrocarbons and suspended solids. This separation is based on the contaminants particle size and their density difference with water.

The heart of the Ultraspin system is the Ultraspin separator itself.

The Ultraspin separator is a long, tapered cone shaped device with one inlet and two outlets. The treated water exits the separator from the outlet at the narrow end of the separator, while the separated oil droplets exit from the larger end of the separator.

Oily water is pumped into the Ultraspin separator through tangential inlets in the head of the separator. This starts a spinning flow that causes a powerful vortex to form within the separator. This vortex accelerates the flow as it moves further through the tapered section of the separator.

This spinning vortex creates a centripetal force that acts on the lighter oil droplets and causes them to move to the center of the vortex. Once in the center of the vortex, running the length of the separator, correct separator pressure settings cause the oil droplets to flow out of a small hole in the end face of the inlet end of the separator for storage.

This leaves the now treated water to flow out of the narrow end section of the separator to be discharged.

Why Is It Such a Powerful Separator?

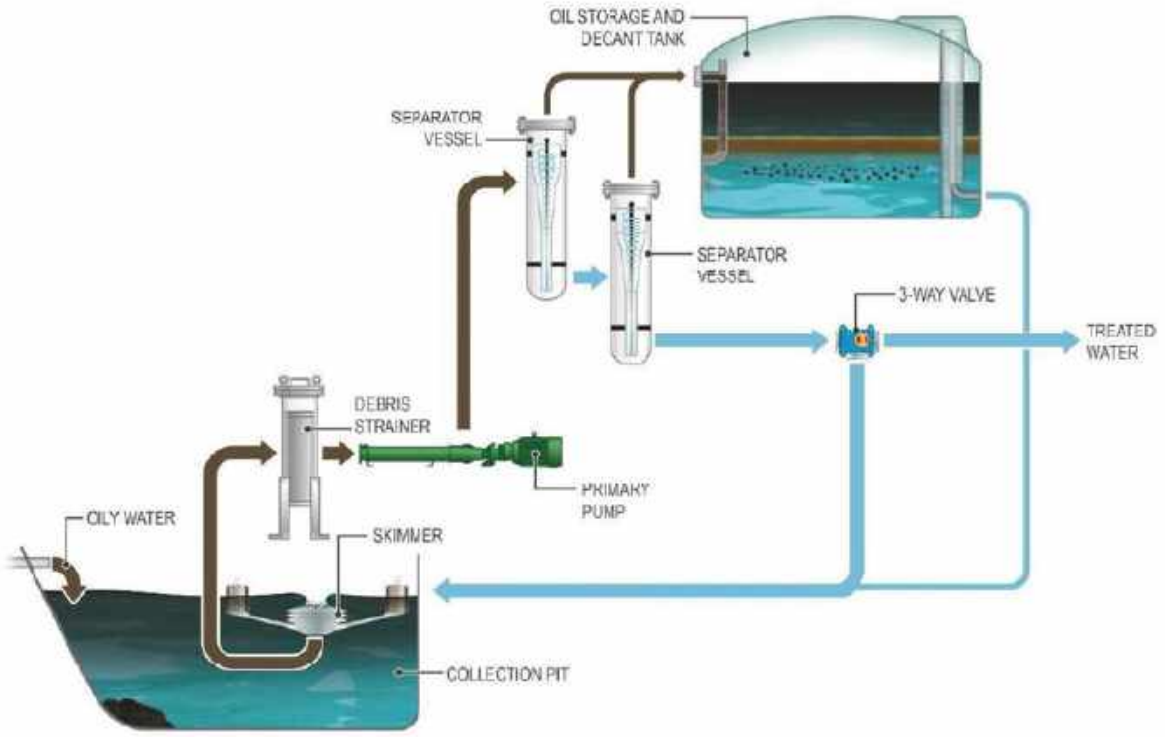
Unlike other separators the Ultraspin separator does not rely on weak gravity forces for separation. The centripetal force generated inside the vortex of the Ultraspin separator is approximately 1,000 times the force of gravity. With such force even small emulsified oil droplets can be separated, even if under 10 microns in diameter.

The Ultraspin separator is one of the simplest and most powerful oily water separators available,

and with no consumables or no chemicals.

1.2 Typical Process Description

The Ultraspin separator can be used in a variety of ways on many different customer applications. The following description is generalised and is provided to illustrate a typical configuration.



1.3 Overview

The Ultraspin Oily Water Separator typically draws waste water contaminated with oils, fats, grease, hydrocarbons and suspended solids from a site pit or a tank. It then separates the contaminated water into a treated water stream and separated oily reject stream. The treated water is recycled (if the system is fitted with this option) to the feed pit to be retreated or sent to the site discharge point. The separated oily stream is sent to an oil storage and decant tank where separated oil is collected, and excess water is automatically drained off back to the pit.

The contaminated oily waste water is collected in a pit/tank where the separator draws the water through an Ultraspin Oil Skimmer. This removes built up oil layers from the pit and means the Ultraspin system can treat the worst waste water first. This prevents the build-up of unsightly and potentially hazardous oil layers. By skimming from the surface and eliminating oil layer build-up also mean that if the pit were to flood, relatively clean water would be spilt, not oil!

The skimmed water passes through a large debris strainer which removes debris over 3mm. This helps prevent blockages and increases the life of downstream equipment.

The Ultraspin separator utilises an air operated diaphragm pump to pump the oily water through the system. The pump selected is a low-shear model, this pump is chosen to minimise emulsification, which would make separation more difficult. Other advantages of the air operated diaphragm pump are that it is self-priming and can tolerate up to 8mm solid particles.

The Ultraspin System utilises a high volumetric efficiency helical rotor pump to provide the pressure and flow for the Ultraspin Separator. The pumps we use have been specifically selected as a low-shear pump; it does not emulsify the oil in the water, which would make separation difficult. Helical rotor pumps are self-priming and tolerant to solid particles.

The Ultraspin Separator is shaped like a tapered tube with a tangential inlet. This creates high centrifugal forces (1000 times the force of gravity) that separates oil droplets from the water. The major advantage over other oily water treatment systems is that there are no moving parts in the Ultraspin Separator liners and therefore and no items to clean and there is very little maintenance required.

The separated oily reject stream from the Ultraspin separator flows to the Oil Storage and Decant (OSD) tank. The separated oil contains some water, this is common with all types of oil separators. The OSD tank design allows excess water to automatically drain out of the tank while a thick oil layer builds up over time. The water that drains out of the tank is returned to the beginning of the process for retreatment. As the tank fills up with oil, the level will slowly rise. A level indicating dipstick can be used to gauge the oil level height so that disposal may be arranged when full.

An electrical panel with PLC provide the operating logic for the operation of the Ultraspin Separator. A level switch connected to the Ultraspin Separator triggers the system to start/stop at high/low pit/tank water levels. Additional recycle control is provided by a electrically actuated valve, which initially diverts the treated water from the separator back to the feed pit/tank for retreatment. After a set period of time the valve will actuate and the treated water will be diverted from recycling back to the pit to the discharge point.

1.4 Description of Key Items

This manual covers a variety of Ultraspin separator models and not all parts of this manual may be relevant. Please ensure you check your exact equipment as to what sections of this manual are applicable.

1.1.1 Civil Infrastructure

Some customer applications require more than one collection pit for optimal water treatment. This additional 'civil infrastructure' may include:

- siltation trap
- gross oil pit
- oil collection pit
- buffer or balance tank for the oily water
- trash screens to prevent large debris from entering the OWS

See Appendix 8 for Typical Oily Water Pit Arrangements
The design of these additional elements must be carried out by suitably qualified Engineers and is beyond the scope of this document. Please consult Ultraspin if you are unsure about the design of these elements.

1.1.2 Oil Skimmer (option)

For information regarding the installation, operation and maintenance of the Ultraspin skimmer please refer to the skimmer manual.

To see our skimmers in action visit
https://www.youtube.com/watch?v=CxTM8-oG2ps

1.1.3 Level Switch (option)

A float level switch rises and falls in accordance with the water level in the oily water collection pit. As the water level rises, the float level switch rises and actuates the electrical controls to start the Ultraspin Separator. Conversely, the system shuts off when the water level drops below the set point.

1.1.4 Backup Strainer

All Ultraspin separators use large strainers to prevent debris from blocking or causing premature wear to critical system components such as pumps and valves. The inlet strainer basket should be monitored and cleaned as per instructions in this manual.

Note: The back-up strainer is not a substitute for debris screening upstream of the feed to the OWS, for example in the site civil design. Proper site design with trash screens in pits and tanks will prevent the back-up strainer from filling too quickly.

1.1.5 Low Shear Helical Rotor Pump

The feed pump for any oily water separator system is very important to the overall effectiveness of an oily water treatment system.

Helical rotor style pump can provide reliable, safe and efficient pumping of oily water. However, whilst many vendors claim to provide "low shear" pumps that will smash and shear oil droplets meaning discharge water quality will be poor.

Ultraspin have designed and selected almost 1000 helical rotor pump systems and has more experience and knowledge in selection than any company – world wide!

Important Note:

1. NOT all helical rotor pumps are equal. Some helical rotor pump designs will emulsify the oily water mixture and prevent the oil water separators (of any vendor type) from working effectively.
2. You should never rely on an oily water pump recommendation from a helical rotor pump vendor. Pump vendors do not have the oil droplet size measuring and the other equipment necessary to properly evaluate and recommend pumps suitable for pumping oily water.

A low-shear helical rotor pump provides the pressure to drive the fluid through the Ultraspin separator and the feed pump selection and design is crucial to the performance of the overall system. Low shear helical rotor pumps reduce emulsification of the oily water.

Important Note:

1. Helical rotor pumps contain wearing items that must be replaced as required.

1.1.6 Pump Damage Protection and Wear reduction (Optional)

Helical rotor pumps are simple and reliable pumps. However, like all pumps, they do contain wearing parts that will need periodic replacement and can also be damaged if not operated correctly.

To maximise design wear life (reducing operating costs), and to minimise the chances of operational pump damage, Ultraspin can provide additional instrumentation and smart PLC logic controllers. This Option if selected provides a combination of instrumentation and PLC logic to provide additional protection in the following events:

- High Suction Pressure:
  - High suction pressure will cause accelerated pump wear.
  - It can be caused by:
    - Pump suction line too long or incorrectly designed
    - Pump suction lift too high
    - Strainer basket being full
    - Blockage in suction line
    - Skimmer blockage due to debris
    - Operator error i.e. restricting pump suction flow via incorrect valve use

- Low Pump discharge pressure:
  - Low pump pressure will cause the oily water separator to not operate correctly. This will result in poor discharge water quality.
  - Some common causes of low pump pressure include:
    - Pump not priming correctly
    - Pump loosing prime in operation. For example, due to suction piping leak, skimmer malfunction
    - Pump stator and/or rotor wear.
    - Pit level switches not operating correctly
    - Operator error i.e. restricting pump suction flow via incorrect valve use for

- High Pump Discharge Pressure:
  - High pump pressure may cause damage to the pump or downstream equipment.
  - This situation can be caused by a downstream blockage or flow restriction
  - Operator error i.e. closing the downstream valve

The optional extra instrumentation will interlock with the control panel and stop the pump operating in the above events, and a fault light will be illuminated.

Important Note:

1. Ultraspin strongly recommends that clients use additional protection (such as the Ultraspin System) when running any helical rotor pump. This applies to all types and makes of treatment systems - not just Ultraspin systems.
2. The separator pump must never be run dry, even for a short duration otherwise major damage to the pump stator will occur.

1.1.7 Mechanical Overpressure protection (Optional)

Helical rotor pumps are positive displacement type pumps. As such there is the possibility of discharge over pressuring if the outlet flow is restricted for any reason.

Ultraspin systems can be equipped with a mechanical pressure relief valve (PRV) as an additional failsafe method of preventing over pressurisation of pipe work.

Important Note:

1. Ultraspin strongly recommends that all clients always use a mechanical PRV when running any helical rotor pump where the discharge could become restricted. In many cases this may be a legislation requirement.

1.1.8 Ultraspin Oil and Suspended Solids Separator – Single Stage

The contaminated oily water is pumped tangentially into the large diameter end of the Ultraspin separator liner. This initiates a spinning vortex which creates the driving force for separation. This spinning vortex is accelerated as it moves down the tapered separation liner generating centripetal force equal to 1000 times the force of gravity. This centripetal force causes the tiny oil droplets to move to the centre of the vortex.

This creates two separated streams:

- Treated Water Stream - which is discharged or recycled back to the pit (if recycle option is fitted)
- Oil Reject Stream - which is sent to an oil storage and decant tank.

Also note that for most oily water treatment situation the oily water contains suspended solids coated in oil or stuck to oil. The Ultraspin separator has been specifically designed to remove a very high % of these suspended solids also.

1.1.9 Ultraspin Oil and Suspended Solids Separator – Two Stage (Option)

As above but two stage for higher overall water quality.

1.1.10 Control System

The control circuit within the PLC provides the control logic for the system to operate.

1.1.11 Recycle/Discharge Function (option)

The Ultraspin OWS recycle function allows the treated water to be returned to the collection pit, on start-up, for a pre-programed period.

This feature may be beneficial when:

- There is a possibility of very high oil load in the collection pit.
- Very high discharge water quality is required

- Dissolved hydrocarbons may be present

The recycle period will initially be set by Ultraspin in our factory prior to delivery. The recycle period may be adjusted during commissioning by an Ultraspin engineer, depending on the specific site conditions. It can also be adjusted in accordance with site conditions by suitably qualified personnel.

During recycle there will be no discharge of treated water from the system. The OWS continues to work and the separated 'reject' stream will flow to the OSD. Once the pre-set recycle time has expired, the 3-way ball valve will actuate to allow treated water to be discharged from the system.

The system will continue to treat the water and discharge until the system is switched OFF either manually or by the control circuit and level switch.

Each time the system restarts, the recycle timer will reset and treated water will be recycled until the recycle time has expired again. The ¼-turn 3-way ball valve is actuated via a electric actuator and controlled by a timer within the PLC.

Important Note:

1. In 'recycle mode' the Ultraspin system will treat the oily water but it is returned to the feed collection pit. There will be no discharge of the final treated water until the recycle time has expired.
2. Do NOT collect oily water 'discharge' samples for compliance analysis during the recycle phase.

1.1.12 Manual Control Operation (option)

Some models of OWS come as a 'Manual Only' operation. This means that the OWS must be manually operated via either a timer, level switch or by manually turning the system on and off.

1.1.13 Backflush Function (option)

The back-up strainer prevents any larger particles (typically >3mm) from entering the oily water treatment system. However, as added security Ultraspin recommends on some applications the addition of automatic timed reject backflush.

This is to ensure that the reject holes and reject lines remains clear. Back flushing occurs automatically. High pressure water, process water or gas is used to back flush. When activated, this higher-pressure fluid is directed to the reject outlet holes. This flow and pressure will force potential blockages and other material that may have lodged in the reject holes out of the reject holes to be flushed downstream. No separation takes place for the few seconds of the back-flushing.

Automatic back-flushing incorporates an electric actuator mounted to the backflushing valve, so that this process is activated automatically at set intervals at pre-programed time intervals.

During the backflushing operation, the operating pressure of the system may drop to below the low pressure set point for the pump discharge. However, if the backflushing operation lasts longer than twenty (20) second, then the low pressure cut-out point may be activated and the system will stop operating. To prevent the low pressure cut-out from activating, ensure that manual backflushing does not last for longer than ten (10) seconds.

1.1.14 Oil Storage and Decant Tank (option)

The separated oil and sludge can be stored in an oil storage & decant (OSD) tank. This tank is either integrated with the system or a separate tank depending on the model. The stream that is connected to the OSD contains the separated contaminants (oil, grease, hydrocarbons, suspended solids) and some water. The long settling time in the tank allows the oil rich sludge to float up and collect at the top of the OSD tank. Excess water on the bottom of the tank is automatically drained from the OSD tank. This water is not clean and is typically returned to the contaminated water pit or tank for treatment. The separated contaminants (oil, grease, hydrocarbons, suspended solids) build up over time and the tank must be periodically emptied.

- See Maintenance Section of this IOM manual for OSD emptying instructions

1.1.15 Aeration Tanks and Blowers (option)

For information regarding the installation, operation and maintenance of the Ultraspin aeration tanks and blowers please refer to the separate Aeration Tanks and Blowers manual.

1.5 Data Summary

See Appendix 8.7 for data sheets for individual equipment.

2 Installation Instructions

Important Note:

- This section does not provide recommendations for site design, including pipe runs, pipe sizes and other important site matters. It is the responsibility of the user to ensure there is proper site design by others BEFORE installation.
- The following is typical and general information only. Sites and client requirements may vary from what is described here.
- Unless we have specifically indicated otherwise in writing, any drawings provided that show site configuration or arrangements are TYPICAL ONLY and do not constitute site design recommendations.

2.1 Services Required Prior to Installation

Please ensure that the following services are available and fully functional before attempting to install the OWS:

- Oily water collection pit/tank, bunding and related infrastructure.
- Drainage from all areas to the main oily water collection pit / tank / pond.
- Power supply appropriate for equipment
- Fresh water hose, hose reel (or similar) is available to facilitate cleaning and maintenance.

Important Note:

- The installer is to supply all interconnecting hoses and fittings (scope defined in drawing).
- Ultraspin can provide hoses and fittings once required lengths are specified (if requested).

Important Note:

An orifice is located prior to the valve termination point on the Ultraspin skid on the treated water outlet manifold. This must always remain installed (between the BSM fittings) to maintain the correct backpressure for correct operation of the Ultraspin Separator.

Important Note:

There are to be no pressure restrictions installed on the downstream side of the treated water stream (such as filters, water meters. etc.), as these will adversely affect the performance of the separator.

2.2 Ultraspin Separator Installation

2.2.1 Safe Maintenance Access

The Ultraspin system should be located so that there is approximately 1000 mm clearance around the equipment to enable maintenance access. It is particularly important to leave clear access to the strainer basket, the pump and the vessel for maintenance.

2.2.2 Process Connections

All process connections to Ultraspin equipment must be at least the size specified in the Piping and Instrumentation Diagram and Datasheet. (see Appendix 7.8)

The PSV valve can be connected to site drains if required, but do not install any valves or restrictions in this line.

2.2.3 Level Switch (optional)

Before installing the level switch(es) you will need to determine the minimum operating water level in the feed pit/tank. The level switch should be mounted so that the low-level float hangs down to this level.

2.3 Installation Checklist

The following installation checklist confirms all the major requirements to complete the installation of the Oil Separation system.

Item	Equipment Name	Installation Requirements
1	**Oily Water Separator**	• Move into position • Bolt to the ground • Process connection from oil skimmer hose • Process connection to site treated water discharge point • Recycle process connection to oily water pit (if fitted) • Process connection to Oil Storage and Water Decant Tank (if fitted) • Power supply
2	**Oil Skimmer**	• Install suction hose • Lift skimmer and hose into oily water collection pond • Check that skimmer is free floating
3	**Oil Storage and Decant Tank**	• Process connection from Oily Water Separator to Oil Storage and Decant Tank • Process connection for Decant return into oily water pit
4	**Level Switch**	• Install in pit at appropriate levels for operation

3 Commissioning

Commissioning procedures can vary widely due to specific company, site, and departmental requirements, or State and/or Federal Governmental or National Standards; as well as scope of equipment involved.

Therefore, Ultraspin is unable provide any site-specific commissioning procedure in this manual. Comprehensive site commissioning that includes verification of installation and equipment operation is only possible by Ultraspin Field Engineers or a qualified person trained by Ultraspin.

The following are minimum required commissioning steps and must be taken as general advice only, and does not constitute commissioning sign-off by Ultraspin. Prior to commissioning this equipment, please ensure that all aspects of installation have been dealt with.

- All piping and connections have been installed as per the relevant Piping & Instrumentation Diagram and general arrangement drawing
- Installation of piping must be done according to good engineering practice
- Site piping design must ensure that the NPSH(A) available at the inlet point of the debris strainer must be at least 70 kPa ABSOLUTE. Ensuring that the there is adequate NSPH(A) is the responsibility of site designers
- Power has been supplied to the control box at the correct voltage
- Strainer, suction piping, all tanks and pits have been primed with water
- Ensure correct direction of rotation of all pumps, aeration blowers, motors and all other rotating equipment. If the motor rotation direction is incorrect, change the motor wiring to change the direction of rotation
- Record all pressures and ensure they are within the ranges set-out in the operation checksheet in Appendix 1.
- Record fluid flowrates from all steams and ensure they match the flows as measured in the Factory Acceptance Test (FAT)
- Ensure that level switch, recycle and backflush (if fitted) operation is as per the control philosophy

Additional commissioning steps will be required, but the scope of these tasks is dependent on many factors that cannot be covered in this manual. Please contact Ultraspin for more information.

4 Operating Instructions

4.1 Routine Operation Checks

When installed correctly, Ultraspin Separators are extremely reliable and requires little operator attention. Typically, no daily operator checks are required. However, periodic operational checks by filling in the Operational Checklist (located in Appendix 7.1) should ensure that the Ultraspin system is working correctly.

These checks are very simple and can be performed by any operational personnel.

4.2 Debris Strainer Cleaning Procedure

- Switch off and isolate the OWS on the electrical panel as specified by your company procedure
- Bleed down pressure by opening the separator sample points.
- Unscrew the eye bolts on top of the debris strainer.
- Remove the lid. You may need to apply slight force to overcome any residual vacuum.
- Carefully remove the perforated sheet strainer basket from the strainer vessel
- Dispose of the debris from the strainer in an appropriate location. DO NOT allow removed debris to be returned to the collection pit.
- Re-install the strainer basket
- Completely fill the strainer with clean water
- Place the lid back on top of the strainer and tighten the eye bolts.
- Separator can now be restarted

Important Note:

NEVER open the strainer with the separated pump operating or with the system in any mode where auto start-up could occur. Isolate the electrical supply at the control panel prior to clearing the strainer.

4.3 Operator Emergency Situations

4.3.1 Stopping the Ultraspin Separator Pump

The system operation can be stopped at any time for any reason by pressing the E-Stop button, or switching the toggle switch to the 'off' position located on the control panel

4.3.2 Oil Spills

If there is a large oil spills into the oily water collection pit, or the feed of the Ultraspin System then the system must be stopped immediately.

Individual company policy and procedures will define what a 'large oil spill' is. After a large oil spill company policy will direct operators in correct disposal procedures. Ensure that the oil spill has been correctly dealt with before resuming operation of the Ultraspin separator.

5 Maintenance Instructions

When installed correctly, the Ultraspin Separator is extremely reliable and requires little maintenance. When maintenance is carried out in accordance with the following schedule this should ensure:

- Treated water discharges that comply with regulations and other requirements.
- Reliable, long term mechanical operation

Important Note:

The frequency of the following schedule is based on typical applications and may vary depending on your site conditions and the nature of your oily water.

5.1 Recommended Maintenance Schedule

Maintenance Level	Recommended Min. Frequency	Required Qualifications
Operational Checks	Weekly	Any operational personnel
Minor Service	6-monthly	Any trade qualified site technician – or similar
Major Service	3-yearly	Mechanical Component: Trade qualified technician with oily water training (Note 1).
		Performance Confirmation: Ultraspin Field Service Engineer, or Engineer approved by Ultraspin who has completed the specialised training.
As Required Service	As required – dictated by outcomes of operational checks	Any trade qualified site personnel – or similar
Specialist Servicing	As required – breakdowns	Ultraspin Field Service Engineer

Note (1)

Major mechanical component servicing requires a higher degree of specialised oily water and oily water separator technology knowledge. Ultraspin Technology provides a 2 day in house training on oily water separator Major Servicing for any suitably qualified personnel.

5.2 Minor Service

For some oily water applications, Minor Service intervals may need to be altered. Please also note that some regulating authorities may require maintenance to be carried out at defined intervals (consult local authorities for details). The maintenance requirements detailed in AS/NZS 4494: 1998 must also be considered.

5.2.1 Approved and competent trade qualified site personnel can carry out Minor Servicing.

5.2.2 Minor Service Overview

Min. frequency:	6-Monthly
Tools required:	24mm spanner x 2 Flat blade screwdriver Soft faced hammer
Parts required:	Minor Service Spare Parts items as detailed in Appendix 8.6 Silicon grease Cleaning rags
Typical time to complete:	One person, 2 hours

5.2.3 Initial Visual Inspection

- Manually start the OWS. Inspect the OWS and surrounds for leaking pipes, hoses, fittings, and valves or pump seals.
- Complete the Operational Checklist (located in Appendix 7.1).
- Inspect the oil skimmer in operation: It should be drawing surface fluid in a consistent and evenly distributed flow across its donut shaped weir.

5.2.4 Clean Strainer

- Clean the Debris Strainer as per the instruction in the Operating Instruction, Section 4.2 of this manual.

5.2.5 Oil Separation Liner o-ring Replacement

- Inspect the reject and inlet holes for blockages and clear if required. Make sure any debris is flushed completely clear of the liner.
- Remove the o-rings on the inlet head and treated water end of the OWS separation liner.
- Install new o-rings as in the Minor Service Kit. Use grease and take care not to damage o-rings during installation.
- Reinstall the separation liner into the separator vessel and gently tap with a soft faced hammer until the liner seats into the vessel end plate.
- Replace the end flange and tighten the hex head bolts
- Close sample valves.

5.2.6 Recycle/Discharge and Backflush Valve

If your equipment contains this optional item(s) you will need to ensure that the recycle/discharge valve actuates as expected by manually changing the timer setting to a lower timescale so that actuation can be observed.

Press the manual backflush button to actuate the back-flushing function

5.2.7 Operation of System after the Service

After a minor service check that the OWS system operates as expected by performing the Routine Operation Checks (Appendix 7.1).

5.3 Major Service (Mechanical Component)

Approved client staff can carry out Minor Servicing. However, Major Servicing requires a higher degree of specialised oily water and oily water separator technology knowledge.

Ultraspin Technology provides in-house training on oily water separator Major Servicing for any suitably qualified personnel.

Ultraspin Technologies Field Service Engineers provides full servicing capabilities ensuring that your Oily Water separator is working at full capacity and that you are not at risk of non-compliant discharge.

Min. frequency:	3-Yearly (or less subject to site requirements)
Tools required:	24mm spanner x 2 Flat bladed screwdriver Soft faced hammer
Parts required:	Major Service Spare Parts items as detailed in the Appendix 7.6 Silicon grease Cleaning rags
Typical time to complete:	One person, 3 + hours (depending on system)

5.3.1 Initial Visual Inspection

- Manually start the OWS. Inspect the OWS and surrounds for leaking pipes, hoses, fittings, and valves or pump seals.
- Complete the Operational Checklist (located in Appendix 7.1).
- Inspect the oil skimmer in operation: It should be drawing surface fluid in a consistent and evenly distributed flow across its donut shaped weir.

5.3.2 Separator liner replacement

- Switch off and isolate the OWS on the electrical panel as specified by your company procedure
- Bleed down pressure via the separator sample points. Leave the sample ports open.
- Undo the hex bolts on the flange on the end of the separation vessel and remove the flange.
- Remove the separator liner from the vessel using a long screwdriver inserted into the removal holes
- Pull the old separator liner out of the vessel slowly
- Grease the O-rings of the new liner with silicon grease
- Install the new separator liner into the separator vessel and gently tap with a soft faced hammer until the liner seats into the vessel end plate
- Replace the end flange and secure the hex bolts.
- Close sample valves.

5.3.3 Strainer vessel seal replacements (EC & EB systems only)

- Bleed down pressure via the separator sample points. Leave the sample points open.
- Undo the eye bolts on the lid of the strainer vessel
- Remove the strainer lid
- Replace the top o-ring in the grove seal between the strainer vessel and the strainer lid with the o-ring in the minor service kit
- Undo the 1-1/2" BSM union on the bottom of the strainer vessel
- Lift strainer and replace with o-ring in the minor service kit
- Close sample valves.

5.3.4 Treated water orifice & BSM seal replacement (EC & EB systems only)

- Bleed down pressure via the separator sample points. Leave the sample points open.
- Undo the 1-1/2" BSM union outlet on the treated water outlet
- Replace the treated water orifice and the o-ring
- Reinstall and retighten the BSM union
- Close sample valves.

5.3.5 Skimmer internals kit replacement

- Remove skimmer from pit and disconnect from skimmer hose by undoing camlock quick connection
- Undo the stainless-steel worm-drive clamp that connects the canvas bellows to the stainless-steel skimmer body
- Install the new skimmer internals kit from the Major Service kit, by slipping the bellows and worm-drive clamp over the skimmer body.
- Align the bellows with bead on the skimmer body by using the pull tabs
- Tighten the worm-drive clamp and reinstall the skimmer onto the skimmer hose camlock connection

5.4 Major Service (Performance Confirmation)

- Once the Major Service has been completed the performance of the system must be confirmed
- De-isolate the system and start the system.
- Complete the Routine Operation Checks (Appendix 7.1).
- Measure the flowrates of the reject and treated water streams and confirm the correct reject ratio is attained.
- Correct the reject ratio as required
- Take accurate visual samples of the Inlet, Outlet and Reject, as per the sampling procedure in Appendix 8.4.
- Confirm that the separator is working as required following the Major Service

5.5 Specialist Servicing

The servicing described above should ensure reliable operation of the Ultraspin system. In many situations, OWS owners will prefer Service and Maintenance to be carried out by OWS specialists who can carry out more specialised work. Ultraspin offers this higher level of service compared to that available via general maintenance staff.

Ultraspin qualified service engineers are familiar with all aspects of this OWS design. Ultraspin can assist with your operational and preventative maintenance schedules:

- Comprehensive Ultraspin service
- Evaluate process design.
- Evaluate site civil infrastructure.
- Audit site oily water sources. Classify all sources of oily water in terms of treatability.
- Review original equipment purchased compared to current use/requirements.
- Fitting spare parts and system recommissioning.
- Advanced oily water treatment equipment operation troubleshooting.
- Advanced oily water compliance testing and troubleshooting.
- HAZOPS site audit.
- Detailed water analysis (may include drop size, chemistry, turbidity).
- Specialist water sampling. May include preparation of samples for external analysis.
- Training for maintenance and operations personnel.
- Review of site specific maintenance documentation.

5.6 As Required Service and Maintenance

Some aspects of service and maintenance need to be carried out as soon as an issue is identified and operators must not wait for scheduled Minor or Major maintenance. This section addresses these matters.

5.6.1 Oil Storage and Decant Tank

Once every 12 months (or sooner if required) the Oil Storage and Decant tank (OSD) MUST be fully drained and cleaned. Solids and scum will build up in the bottom of the tank and this must be periodically removed for the oil collection and decant tank to work effectively.

Emptying the decant tank:

- Using the tank drain valve pump out the entire contents of the tank.
- Rinse out the tank to the clear any remaining waste off the walls or sludge on the bottom of the tank.
- Refill the tank with clean water until you see water running out the tank overflow.

Important Note

1. The OSD Tank must be completely emptied when the level indicates that it is required OR at leastonce every 12 months.
2. When cleaning out the OSD tank completely empty all the contents of the tank and hose down the inside to remove all contents if required.

5.6.2 Helical Rotor Pump Wear

All helical rotor pumps have wearing components which will require periodic maintenance or replacement. The frequency that pump components need replacement will vary from site to site and depends on many factors including but not limited to the solids load, the liquid temperature and suction lift. This section provides guidance with assessing pump wear.

For more information on protection options offered by Ultraspin to reduce the chance of pump damage and wear, please refer to Appendix 3.

Please consult Appendix 8.6 for a list of pump parts that may be required.

5.6.3 Pump Rotor and Stator Wear

You can assess the level of rotor/stator wear by monitoring the pump discharge pressure.

Pressure range	Action required
300-550kPa	No action required.
Under 300kPa	This indicates rotor and stator are significantly worn and there is a high chance of oil in your treated water discharge. You will need to replace the pump rotor and stator. In some cases, it is more cost effective to replace the whole pump rather than replacing only the rotor and stator. For guidance what will work best for you please contact Ultraspin.
Over 550kPa	This is indicating a fault with the operation of the system. Refer to the Troubleshooting Matrix in section 6 for assistance or contact Ultraspin.

After replacing the rotor and stator the operating pump discharge pressure must be checked to ensure it is within the normal operating range of 300 – 550 kPa.

Important Notes:

- As the rotor and stator of the pump wear the pump discharge pressure will drop. This means that there will be lower flow through the separator which will lower the separators oil removal efficiency. If you have very strict oil and grease discharge limits you may find you need to replace pump parts sooner than recommended above.
- The OWS system will not separate oil from water effectively if the Ultraspin supplied pump is changed in any way. Please consult Ultraspin prior to making any changes.
- Making changes in part or in full to a system pump without approval by Ultraspin will void equipment warranty.

5.6.4 Lubrication Schedule

EB35

Equipment Description	Equipment Number	Lubrication location / fill point	Lubricant Description	First Fill	Frequency of change	Quantity	Additional Information
Separator Pump	PP01	Sheathed coupling connections	Pump proprietary grease	N/A	N/A	19 mL / duct	Upon rebuild
Separator Motor	PP01	Roller bearings	Gadus S2 V100 2 or equivalent	N/A	N/A	As required	Upon rebuild

EB70

Equipment Description	Equipment Number	Lubrication location / fill point	Lubricant Description	First Fill	Frequency of change	Quantity	Additional Information
Separator Pump	PP01	Gearbox housing	Mineral oil, Mobil CLP 220 or equivalent	N/A	10,000 hours	0.5 L	If operating hours per year is less than 10,000 then the oil should be changed once per year
Separator Pump	PP01	Sheathed coupling connections	Pump proprietary grease	N/A	N/A	19 mL / duct	Upon rebuild
Separator Motor	PP01	Roller bearings	Gadus S2 V100 2 or equivalent	N/A	N/A	As required	Upon rebuild

5.6.5 Collection Pit Desludging

In many applications the raw untreated oily water flows first to one or more effluent collection pits. These pits will accumulate heavy suspended solids and sludge towards the bottom of the pits.

Important Note

- Any suspended solids and sludge that collects in any pits must be removed regularly.
- Failure to keep pits clean may result in damage to the OWS or a loss in water treatment efficiency.

Operators will need to remove sludge and clean pits when:

- Sludge build-up is might interfere with the skimmer operation
- Sludge volumes compromise the effective working capacity volume of the pits
- Scheduled cleanouts

For correct OWS system performance and to achieve the desired water quality results, the following pit pump out procedure must be followed.

1. Immediately before the pit is pumped out, the main isolator on the Ultraspin control box must be turned OFF.
2. Ultraspin recommend that after a pit pump out the pits must be refilled with fresh water.
3. After the pits are refilled, switch the main isolator on the Ultraspin control box ON.

If separator switched ON with insufficient water in either pit, the separator pump will run dry and system will shut down on low pressure/flow.

6 Troubleshooting Matrix

No	Problem	Possible Cause/Problem	Suggested Action
1	**Lower than expected Oil and Grease or Hydrocarbon Separation Performance** **AND/OR high discharge concentration**	Low or no reject flow	See 5.
		Low pump flow or low pump discharge pressure (e.g. <300 kPa)	See 2.
		False high oil and grease / HC's analysis caused by incorrect oily water sampling technique	Repeat sample collection: • At the correct time in discharge cycle • With correct oily water sampling methods. • See Ultraspin video training on sampling technique.
		False high oil and grease / HC's analysis caused by incorrect laboratory analysis method	Many laboratories are NATA certified but use the wrong technique for Oil and Grease and HC's analysis. Confirm Lab is using the EPA / Certified approved technique.
		Oil droplets size too small (e.g. <10 micron – white water). Excessive amount of emulsifying chemicals (e.g. Detergent, Glycol, biocide, corrosion inhibitors or surfactants) in the pit	Pump out, clean and flush pit. Investigate how the problem chemicals entered the pit and take action to prevent further ingress.
		Worn or damaged Separator liner	Consult IOM for procedures to check for worn or damaged separator liners. Replace worn or damaged items
		New source of oily water (or new transfer pumps) being introduced to the feed of the OWS system.	Contact Ultraspin with details of the new oily water source. Adjustment to the Ultraspin system may be required.
		Recycle time (if this option installed) too low	Increase the recycle time in the control system (Ultraspin task) or if temporary situation - complete another recycle sequence of the system (i.e. restart Ultraspin).
		Excessively high oil feed concentration (more than in design basis)	Check the side design documentation to confirm if feed oil concentration is within specification. If concentration too high investigate and rectify.
		Skimmer needs cleaning	Adjust or clean skimmer. See the skimmer IOM.
		Oil collection pit/tank/ vessel is full	Empty or pump out oil collection vessel.
		Blockage in the underflow piping or Ultraspin	See 6.

2	**Low pump flow (e.g. <300 KPa)**	Pump worn or damaged	Replace worn or damaged parts.
		Back flush line (if installed) is stuck open	Rectify stuck valves.
		Separator liner(s) missing, worn or damaged.	Install liners or replace worn or damaged items.
3	**Pump automatically shutting down on low or high pressure (including PSV leak or operation)**	Pump not priming correctly.	See Pump manual.
		There is a blocked suction line.	Clear blockage
		There is an air leak in the pump suction.	Fix air leak
		Shutting down due to insufficient water feed.	Possible causes: • Level controls not set at the correct heights • Pit empty (manual control not turned off) • Low level switch failed to shut unit off (see 5.0).
		Skimmer hung up on obstruction.	Remove skimmer from obstruction in pit and rectify to prevent reoccurrence.
		Pump NPSH(A) is too low	For example, suction lift excessive. Rectify problems to increase NPSA.
		High pressure shut down – there may be a restriction in the discharge of the pump.	Clear restriction. For example: • Open valves (suction or discharge) may be closed. • Clear blockage in the outlet piping or the Ultraspin Separator.
4	**Pump operation erratic**	There is an air leak in the suction piping.	Repair air leak in pump suction piping.
		There is a blocked suction line.	Clear blockage.
		Pump NPSH(A) is too low	For example, suction lift excessive. Rectify problems to increase NPSA.

5	**Low or no Ultraspin reject (oil/water) flow**	What is the correct / design reject ration %?	Consult the site installation and design documentation to determine the correct design reject ratio. Measure inlet flow and the actual reject flows to calculate the reject ration and compare it to design.
		Incorrect system back pressure	Investigate cause of low system backpressure and rectify.
		Ultraspin reject orifice blocked	Shut system and use de-blocking tool to clear blockage. **Important:** Shut unit off before removing the reject cap. Replace before restarting.
		Treated water outlet orifice(s) are missing.	Consult Ultraspin. Replace treated water outlet orifice(s) may be required.
		Low Pump Flow	See 2.
		Separator liner worn or damaged	Consult IOM for procedures to check for worn or damaged separator liners. Replace worn or damaged items.
6	**High Ultraspin Reject Flow**	Separator liner worn or damaged	Replace worn parts
		Ultraspin underflow blocked	Shut system down, unscrew outlet union and clear blockage, ensuring plastic back-pressure orifice is replaced.
		Reject O-Ring Seal is missing	Shut down system, de-pressurise and replace liner O-rings.
		Clean water outlet piping is blocked	Clear the Ultraspin clean water outlet pipes (recycle and discharge lines).
		Ultraspin inlet head not installed correctly	Remove Ultraspin inlet head and re-install correctly. Check for missing O-rings.

7	**No Water decant Flow from Oil Tank**	Start-up delay. No Reject Oil Tank Water Decant blocked Oil collection and decant tank is filling	It is normal that there may be no water flow from the decant tank immediately after start-up. Wait 5 min. and recheck. See 5. Completely empty and clean decant tank. Wait for tank to fill up and recheck.
8	**Not covered above**	**For any matters not covered above please consult Ultraspin.**	

7 Appendices

- Appendix 1 – Operation Checklist
- Appendix 2 – Separator Liner Reject Orifice Wear
- Appendix 3 – Pump Protection Options
- Appendix 4 – Sampling Procedure
- Appendix 5 – Performance Factors
- Appendix 6 – Spare Parts Lists
- Appendix 7 – Equipment Data Sheets
- Appendix 8 – Process Control Philosophy

7.1 Appendix 1 - Operation Checklist

To be conducted before and after minor or major service; or as requested by Ultraspin.

#	*Check*	*Result*	*Correct Operating Condition*
1	**Pump discharge / Separator Inlet Pressure**	_____kPa	• Must be within the range 300 to 550 kPa • The Pump must be running smoothly, no unusual noises ACTION: If the pump pressures are outside the range above it is indicating a fault and the separator will not be working. You should immediately contact Ultraspin for further advice.
2	**Separator Outlet Pressure**	_____kPa	• Must be within the range 100 to 200 kPa ACTION: If the pressures are outside the range above it is indicating a fault and the separator will not be working. You should immediately contact Ultraspin for further advice.
3	**Oil Reject Flow** [1]	_____ l/min	• Is the oily water reject flowing as expected? Temporarily remove the push fit reject line to inspect the reject flow. Re-attach when completed. ACTION: If the oil reject is not flowing as per the original data sheet it is indicating a fault and the separator will not be working. You should immediately contact Ultraspin for further advice.
4	**Oil Skimmer Operation**	Yes / No	• No debris blocking flow • Evenly distributed flow across the donut shaped weir. ACTION: Clear any blockage
5	**Oil & Decant Tank**	_____L Volume of Oil in the Tank	• NOT full of oil • Use dipstick, water finding paste, or level indicators ACTION: If the check indicates the tank is full of oil you will need to arrange a tank pump out immediately. If the tank is full of oil the Ultraspin separator is not able to store the separated oil and the water discharge quality will not be acceptable.
6	**Debris Strainer**	Emptied: Yes / No	• Check and empty the debris strainer basket. • Cleaning frequency will depend on the trash load allowed to arrive in the collection pits.

If there appears to be any problem with any part of this routine operating check contact service and maintenance personal OR Consult Ultraspin for more help.

7.2 Appendix 2 - Separator Liner Reject Orifice Wear

The Ultraspin separator liner is made from high wear resistant materials. However, velocities in some regions of the separator exceed 15 m/sec and over time some wear is inevitable.

7.2.1 Liner Head Wear

This wear occurs first in the reject hole area of the head section of the separator liner. For proper operation of the oil separator it is important that the head section is replaced when the outside diameter of the reject (as measured on the end face) exceeds 6.5 mm. When the reject hole at the end face is more than 6.5 mm the separator will no longer be functioning correctly and the water will not be treated properly.

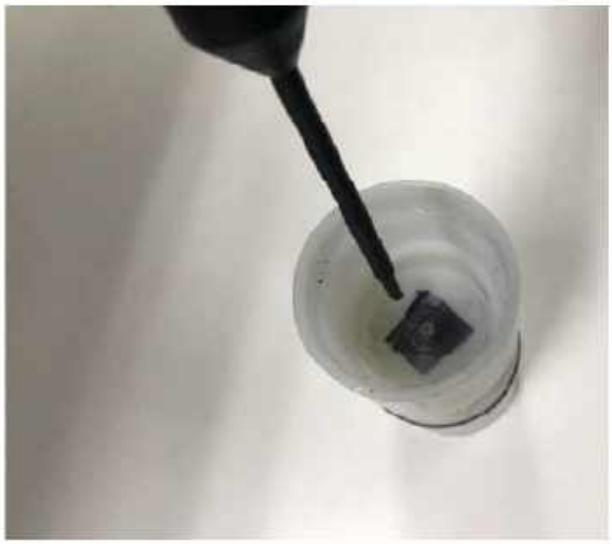
If the liner head is found to be worn it must be replaced before the Ultraspin Oily Water Separator is put back into service.

Measuring the wear of the head is easy. Ultraspin has a simple test kit for this purpose as shown in the photos below.

Use the following procedure to determine if you need to replace head section:

1. Remove liner from the vessel
2. Carefully unscrew the head section from the liner
3. Clean the head section with water then dry thoroughly
4. Using the Ultraspin wide tipped marking pen swipe across reject orifice on the inside face ofthe liner head with mild pressure. Don't press too hard. Mild pressure can be applied by holding the pen between thumb and one finger. It may be necessary to swipe in a few different directions

5. Insert the pin tool into the centre of the reject orifice of the head. See the pictures below



6. If you can see any white rimmed areas outside the pin then the liner reject orifice is wornand the head section must be replaced from the Minor Service Parts Kit
7. Once the Pin Tool has been inserted into the inside of the liner head it will be clear ifthere is any excessive wear to the reject orifice. Indicated by a visible white unmarked rim around the pin tool.
8. See below of examples of 'Passed' and 'Failed' liner heads.
9. If the liner head passes the assessment then it can be reinstalled on to the liner body andrefitted into the separator vessel, using the reverse of the instructions above.
10. If the liner head fails the wear assessment it must be replaced before the Ultraspin OilyWater separator is put back into service
11. Risk of non-complaint discharge if the system is run with worn separator liners.

Important Note

- The new Liner Head from the Minor Service Parts Kit must be threaded tightly onto the main body ofthe liner until the internal faces meet with no gap, this is **vitally important**

7.2.2 Separator Liner Wear

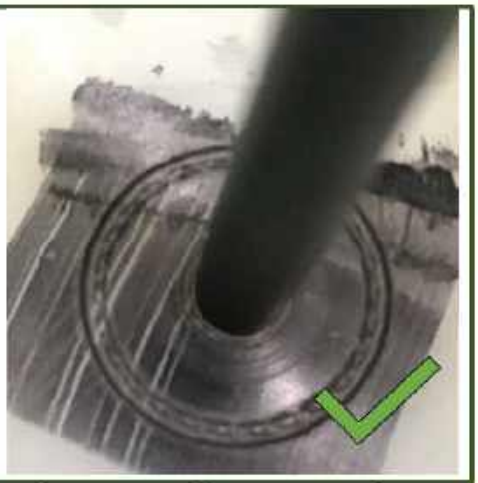
Eventually wear occurs along the entire length of the liner. This is difficult to measure in the field. Experience has shown that the entire liners will need to be replaced every:

- 3 years

  OR

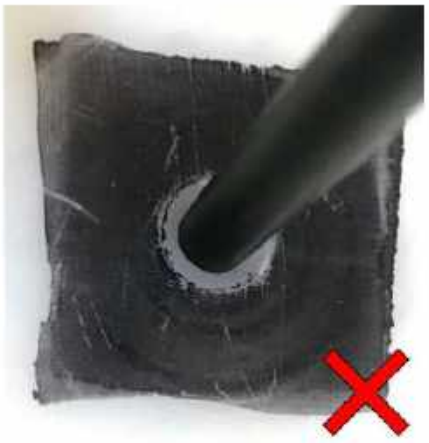
- 10,000 hours of actual operation; whichever occurs first.

Passed



No white rim visable around the tool indicates that reject orifice wear is within operational limits

Failed



White rim visable around tool indicates that the reject orifice wear exceedes operational limits

7.3 Appendix 3 - Pump Protection Options

7.3.1 Pump Damage Protection and Wear reduction (Optional)

Helical rotor pumps are simple and reliable pumps. However, like all pumps, they do contain wearing parts that will need periodic replacement and can also be damaged if not operated correctly.

To maximise design wear life (reducing operating costs), and to minimise the chances of operational pump damage, Ultraspin can provide additional instrumentation and smart PLC logic controllers. This Option if selected provides a combination of instrumentation and PLC logic to provide additional protection in the following events:

- High Suction Pressure:
  - High suction pressure will cause accelerated pump wear.
  - It can be caused by:
    - Pump suction line too long or incorrectly designed
    - Pump suction lift too high
    - Strainer basket being full
    - Blockage in suction line
    - Skimmer blockage due to debris
    - Operator error i.e. restricting pump suction flow via incorrect valve use

- Low Pump discharge pressure:
  - Low pump pressure will cause the oily water separator to not operate correctly. This will result in poor discharge water quality.
  - Some common causes of low pump pressure include:
    - Pump not priming correctly
    - Pump loosing prime in operation i.e. due to suction piping leak
    - Pump stator and/or rotor wear.
    - Pit level switches not operating correctly
    - Operator error i.e. restricting pump suction flow via incorrect valve use for

- High Pump Discharge Pressure:
  - High pump pressure may cause damage to the pump or downstream equipment.
  - This situation can be caused by a downstream blockage or flow restriction
  - Operator error i.e. closing the downstream valve

The optional extra instrumentation will interlock with the control panel and stop the pump operating in the above events, and a fault light will be illuminated.

Important Note:

3. Ultraspin strongly recommends that clients use additional protection (such as the Ultraspin System) when running any helical rotor pump. This applies to all types and makes of treatment systems - not just Ultraspin systems.
4. The separator pump must never be run dry, even for a short duration otherwise major damage to the pump stator will occur.

7.3.2 Mechanical Overpressure protection (Optional)

Helical rotor pumps are positive displacement type pumps. As such there is the possibility of discharge over pressuring if the outlet flow is restricted for any reason.

Ultraspin systems can be equipped with a mechanical pressure relief valve (PRV) as an additional failsafe method of preventing over pressurisation of pipe work.

Important Note:

2. Ultraspin strongly recommends that all clients always use a mechanical PRV when running any helical rotor pump where the discharge could become restricted. In many cases this may be a legislation requirement.

7.4 Appendix 4 - Sampling Procedure

How to Sample Oily Water

Safety First
Check with the relevant personnel that it's safe and wear any necessary PPE

Pre Prepared Sample Bottle
1L labelled wide-mouthed clear glass bottle with a Teflon coated lid

Cleaned with hot water and detergent, rinsed with water, rinsed with an appropriate solvent and acidified

Step 1 Open the sample valve completely (full bore) and allow it to flush for 2 minutes. This will clear out oil, solids and silt that accumulates over time behind the valve

2 mins

Step 2

Close the valve to a level you are comfortable with for the sampling. Don't adjust the valve until the sampling is complete as this can dislodge debris

Step 3 Place jar under the flow and fill to around 90% full. Do not overfill – oil floats and will be lost if you overfill the jar. Remove the jar out of the stream BEFORE you close the sample point

Step 4

Lid tightly and refrigerate as soon as possible if not analysing the sample within 2 hours

For more information on proper oily water sampling procedure, please refer to the video below.

For an on-site video of the proper oily water sampling technique, visit https://www.youtube.com/watch?v=G5KgsE-N5dE

7.5 Appendix 5 - Factors Affecting Oil Water Separation Performance

There are many factors that affect the performance of an installed oily water separator system. Many of these factors are within the control of and are the responsibility of the customer. Others are related to the equipment and equipment selection and may be the responsibility of the equipment vendor.

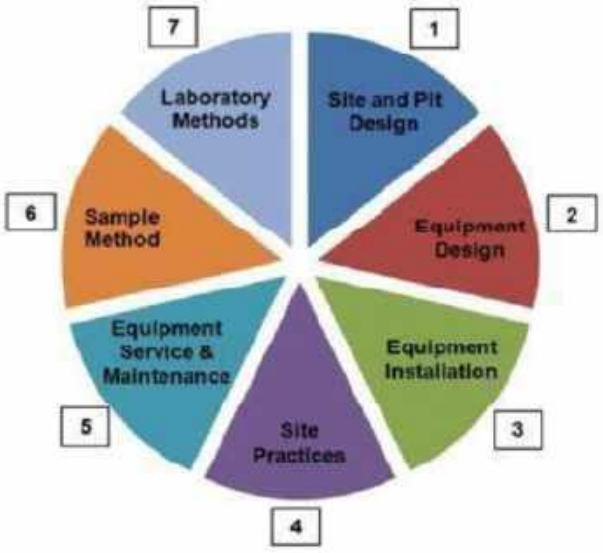
Customers do not always understand the factors and often take a simplistic approach by only considering factors related to equipment.

Oily water is a specialised area and many times customers do not have the expertise to understand all the factors within their control. Ultraspin can help by providing training and issue certificates of competence.

When we are contacted to address an OWS issue we investigate all factors as any area could be the source of the problem.

7.5.1 How Can Ultraspin Help

- Provide education to the people responsible for managing and maintaining the system.
- Provide OEM compliant service and maintenance programs.
- Provide site audit, sample collection and analysis services.
- Provide certified training on:
    - Oily water science to better manage Oily Water Separation
    - How to make sure laboratories are performing applicable analysis
    - Correctly collecting samples.
    - Site Audits.
    - Service and Maintenance details.



7.6 Appendix 6 - Spare Parts List

	Spare Parts List EB35-AR	Rev 0 Date: 10/07/24

Minor Service Spare Parts

The following spare parts must be replaced during the Minor Service

Description	Part No.	Qty.
O-ring Kit: Ultraspin deoiler liner (SUBLN050)	ORNKIT-07	1
Standard Capacity liner head (SUBLN050)	LIN070	1*

**Item is only required as per the results of the Liner Inspection Test*

Major Service Spare Parts

The following spare parts must be replaced during the Major Service

Description	Part No.	Qty.
S1 Skimmer Internals Replacement Kit - donut, bellows, rings and clamps	SUBSK026	1
O-ring Kit: Pneumatic and Electric 3.5 m3/hr single stage systems	ORNKIT-03	1
Ultraspin standard capacity deoiler liner	SUBLN050	1

Other Spare Parts

Customers may choose to purchase the following parts to:

- Upgrade the equipment to suit their application
- Hold onsite to ensure parts are readily available
- Replace items in the event they become damaged

Description	Part No.	Qty.
Helical Rotor Pump: Nom. 3.5 m3/hr @ 4.5 Bar with Motor	PMP485	1
Helical Rotor Pump Stator	-	1
Helical Rotor Pump Rotor	-	1
Mechanical seal: SiC/SiC/Viton	-	1
Pressure Transmitter 1/4 inch BSP (m) with M12 socket	INT158	1
Electric Level Float Switch with 20 Metre Lead and Weight	LVL015	1
Recycle/discharge Ball valve 3-way (L-port) 1 inch BSP (f) (316 SS)	VLV172	1
Electric actuator (24 V dc), 30 Nm torque (90 deg rotation)	VLV175	1
Pressure relief valve, ½ inch BSP (set pressure 650kPa @ 3.5 m3/h) (316 SS)	VLV202	1
Pressure gauge 0-1000 kPa 1/2 inch BSPT (m) bottom entry (316 SS)	INT041	2
Vacuum gauge -100-0 kPa 1/2 inch BSPT (m) bottom entry	INT042	1

7.7 Appendix 7 - Equipment Data Sheets

		Units	Data	
	DESCRIPTION			
1	Manufacturer		Ultraspin Technology Pty. Ltd	
2	Separator type		Hydrocyclone	
3	Model		EB35	EB70
4	Operating hours	h/day	24	
5	Nominal capacity (inlet flow)	m^3/hr	3.5	7.0
	SERVICE REQUIREMENTS			
6	Environment	Indoors/Outdoors/Undercover	Indoors/Outdoors/Undercover	
7	Ambient temperature range	°C	Ambient in full sun	
8	Nominal design life	years	20	
9	Drive type	Pneumatic/Electric	Electric	
10	Maximum noise pressure level	dBA @ 1m	<70	
11	Power supply	Volt/Hz/Phases	415 / 50 / 3	
12	Rated power	kW	1.5	2.2
13	Full load amps	Amps	3.3	4.5
	INTAKE FLUID			
14	Fluid temperature range	°C	5-45	
15	Fluid pH range		5 to 9	
	SYSTEM COMPONENTS (OIL-WATER SEPARATOR)			
	OIL-WATER SEPARATOR STRAINER			
16	Strainer type		Housing with strainer basket	
17	Strainer size	dia / H mm	350 / 600	
18	Trash holding capacity	L	7	
19	Screen type		Easy clean perforated sheet	
20	Screen size	mm	3	
21	Strainer lid opening		Quick opening eye bolts on flange end	
22	Material of construction		Stainless steel 304	
23	O-rings material of construction		Nitrile (NBR)	Viton (FKM)
24	Pressure rating	kPag	-80	
	OIL-WATER SEPARATOR PUMP			
25	OWS pump type		Progressive cavity (helical rotor)	
26	Nominal rated capacity at operating point (flow / head)	m^3/hr / m	3.5 / 40	7.0 / 40
27	Duty point		Refer to pump curve	
28	Efficiency @ duty point	%	> 96	
29	Self Priming	Y / N	Y	
30	Materials of construction (casing wetted parts)		Cast iron	
31	Materials of construction (rotor)		Hard chromed, Stainless Steel AISI 420	
32	Materials of construction (stator)		Nitrile (NBR)	
33	Materials of construction (mechanical seal)		Carbide/FKM	

	OIL-WATER SEPARATOR VESSEL			
34	Number of oil-water separator vessels		1	
35	Material of construction		Stainless Steel 304	
36	Gasket material of construction		Compressed non-asbestos fibre	
37	Arrangement		Horizontal shell with holding plates	
38	Design code		AS4041 Class 3	
39	Vessel class		Class 3	
40	Hazard level		E	
41	Design Pressure	kPag	600	
	OIL-WATER SEPARATOR LINERS			
42	Number of cyclones in separator #1 / type		x1 Standard capacity	x2 Standard capacity
43	Material of construction		UHMWPE (10 million g/mol)/Stainless steel 316	
44	O-rings material of construction		Viton (FKM)	
	RECYCLE / DISCHARGE VALVE (OPTIONAL - IF FITTED)			
45	Valve material of construction		Stainless Steel 316	
46	Valve type		3-way L-port	
47	Actuator details		Electrically actuated (24 Vdc)	
48	Actuator materials of construction		Marine grade aluminium	
Notes	1) This document should be read in conjunction with the relevant Ultraspin drawings			
	2) This is typical data only and is subject to change without notice			
	3) If there is any discrepancy between the drawings and this data sheet, please notify Ultraspin immediately			

7.8 Appendix 8 - Process Control Philosophy

Process Control Philosophy

Document Number: EB-AR

Revision: 2

A SUMMARY

The control system functional description refers to the EB35-AR and EB70-AR Ultraspin Oil Water Separator (OWS).

Refer to accompanying drawing: Doc no. ELC233/MD Rev 1.

B ELECTRICAL EQUIPMENT

The electrical control panel for the Ultraspin OWS will be installed on the OWS skid and will be used for process control.

Item	Rating
Electrical Control Panel	
Main Panel	415 VAC/3~/50Hz, IP55
Main Isolator Switch	415 VAC/3~/50Hz
Motor Contactor for Separator Pump	415 VAC/3~/50Hz
Motor Overload Control for EB35 Separator Pump	3.5 A
Motor Overload Control for EB70 Separator Pump	4.45 A
Motors	
Motor for OWS Pump EB35	1.5 kW, 415 VAC/3~/50Hz
Motor for OWS Pump EB70	2.2 kW, 415 VAC/3~/50Hz
Instrumentation	
Pressure Transmitter for Pressure Protection	24VDC, 0-10 V Output
Level Float Switch for High Pit Level Detection	Open/close contact
Actuated Valves	
Recycle/Discharge Valve	24 VDC
Other	
Pressure Relief Valve	3.5/7 m3/hr @ 650 kPa (set pressure)

C CONTROL SYSTEM FUNCTIONAL DESCRIPTION

C.1 LEVEL SWITCH OPERATION

If the water level in the oily water pit is low, the level float switch will hang in the downward position (de-energised), indicating low pit level.

As the water level in the oily water pit increases the level float switch will lift in the upward position (energised), indicating high pit level.

C.2 SEPARATOR OPERATION

C.2.1 Separator - Starting Operation

The EB35/70-AR pump will operate in accordance with the position of the level switch in the oily water pit, as per the following sequence.

- Separator pump will remain off at low pit level.
  - The *Separator Standby* indicator light will illuminate when the separator pump is not operating.
- Separator pump will start operating at high pit level.
  - The *Separator Operating* indicator light will illuminate when the separator pump is operating.

C.2.2 Separator – Normal Operation and Alarms

The Ultraspin EB35/70-AR Separator pump will continue to operate when started until any of the following conditions are met:

- The *System On/Off* selector switch on the main electrical panel is turned from *On* to *Off*.
- An Alarm Condition is met.
- The water in the oily water pit returns to low level, de-energising the level float switch.

C.3 RECYCLE/DISCHARGE OPERATION

At every successive start sequence, the separator will begin in Recycle mode, starting a timer countdown within the Modular Smart Relay. In Recycle mode the separator diverts the treated water stream back to the silt trap.

Once the set time has elapsed, the separator will change to Discharge mode, diverting the treated water stream to the final location for disposal.

- The discharge stage is indicated when the *Discharge Mode* indicator light is illuminated.

C.4 ALARM/ALERT CONDITIONS

Any of the following conditions will activate an alarm/alert, illuminating the corresponding red indicator light on the Electrical Control Panel.

In addition, the audible alarm and visual flashing beacon will trigger to indicate an alarm/alert condition to the operator.

C.4.1 High/Low Pressure Protection Alarm

The separator will stop operating if the Pressure Transmitter senses a lower or higher than normal pressure.

This will illuminate *High/Low Pressure Protection Alarm* indicator light.

C.4.2 Motor Overload Alarm

The separator will stop operating if the motor overload from the separator pump motor is tripped.

This will illuminate the common *Separator Alarm* indicator light.

C.4.3 Separator Fail to Start Alarm

If the separator fails to start on high pit level, this will illuminate the common *Separator Alarm* indicator light.

C.4.4 Actuator Position Alert

If the actuator fails to reach its open or closed position, this will illuminate the *Actuator Alert* indicator light. The indicator will automatically turn off if the actuator reaches its intended position.

The separator will continue operating.

C.5 EMERGENCY STOP

Pressing the *Emergency Stop* button on the Electrical Control Panel will electrically isolate and immediately stop the following in their current position:

- Separator Pump
- Recycle/Discharge Actuator Valve

To disengage, the Emergency Stop button must be twisted. After disengaging the *Emergency Stop*, the separator will remain off. The separator will return to the default starting position once the system is restarted by initiating the Alarm Reset Sequence (C.7).

C.6 ALARM MUTE

The audible alarm can be muted by the operator by pressing the black *Alarm Mute* push button. The visual alarm beacon will continue to flash until the alarm condition is reset.

C.7 ALARM RESET SEQUENCE

The Alarm Reset Sequence is used to return the system to normal operating conditions after an alarm/alert condition has been removed. This will reset all alarms and timers, returning the system to Standby until normal starting operation conditions (C2.1) are met.

The following sequence must be followed:

- Switch the *System On/Off* selector switch from *ON* to *OFF* position.
- Wait 2 seconds.
- Switch the *System On/Off* selector switch from *OFF* to *ON* position.

D TIMER AND THRESHOLD SETTINGS

#	Item	Description	Setting
Operational Timers			
1	Level Float Switch (up)	Level Switch On delay	5 sec
2	Level Float Switch (down)	Level Switch Off delay	5 sec
3	Recycle/Discharge Actuator	Recycle timer on start-up (before switching to Discharge mode)	30 min
Alarm Timers			
4	Recycle/Discharge Actuator	Actuator alarm delay	60 sec
5	High/Low Pressure Transmitter	High/Low pressure start-up alarm delay	30 sec
6	High/Low Pressure Transmitter	High/Low pressure operation alarm delay	10 sec
Alarm Thresholds			
7	Low Pressure Threshold	Low threshold condition to trigger Low/High Pressure Protection alarm timer	250kPa
8	High Pressure Threshold	High threshold condition to trigger Low/High Pressure Protection alarm timer	600kPa