

1. OPERATOR GUIDE - MAINTENANCE

FLOATING TREATMENT MEDIA

Waterclean will maintain the Floating Treatment Media for a period of 12 months post commissioning. This is to ensure that at handover the client receives a high quality, professional and technically sound system installation.

MAINTENANCE INCLUDES THE FOLLOWING REQUIREMENTS:

- A. **Waterclean** shall monitor and maintain the system for a period of twelve (12) months from the date of Substantial Completion of the Floating Treatment Media system installation upon signoff.
- B. NOTE: Sampling and monitoring of the system is expected to be carried out by the client as part of the client's normal operation and maintenance procedures. Sample results are to be sent through to **Waterclean** on a regular basis.
- C. **Waterclean** shall submit a maintenance report at the end of each maintenance quarter. The maintenance report shall include all the inspection details as shown below and will be submitted in a format subjected to the approval of the client.
- D. Six (6) weeks before the end of the Maintenance period, **Waterclean** shall advise the client of the expiry date and arrange for all the preparations required for the inspection of the islands
- E. **Waterclean** shall rectify any defect found in the Works to the satisfaction of the client and **Waterclean**. The maintenance period will not be considered complete until after the final inspection is carried out and all remedial works, if any, are completed by **Waterclean**.

THE MAINTENANCE OF THE FLOATING TREATMENT MEDIA SYSTEM SHALL BE IN ACCORDANCE TO THE FOLLOWING FREQUENCY AND PROCEDURE:

- A. Plant coverage and establishment - 1 time per quarter to check on physical appearance and leaf colour as indicators of plant establishment status. Should the plant mortality rate exceed 5%, replacements are to be made to maintain a 95% survival rate.
- B. Plant growth - 1 time per quarter plant growth should be monitored in 1m² plots, replicated at least 3 times for each species. Parameters measured include plant height and plant numbers in each plot.
- C. Buoyancy - 1 time per quarter buoyancy should be monitored by checking the water level on the indicator of the Floating Treatment Media modules
- D. Weed control - every quarter any unwanted plants and other grasses which root on the Floating Treatment Media modules have to be removed carefully. All problematic embankment species will be identified and controlled with a regular herbicide program.
- E. Harvesting – A Harvesting Program has been incorporated in this guide. Plant density is optimised to allow for this.
- F. Plant mortality the expired plants for each plant species shall be replaced after installation as part of a twelve (12) month maintenance program. **Waterclean** shall ensure 95% plant survival at the end of the maintenance program.

FINAL HAND OVER:

- A. Prior to handing over to the client, **Waterclean** shall ensure the Floating Treatment Media system is in proper operating condition and all remedial works, if any, are rectified to the satisfaction of **Waterclean** and the client.
- B. **Waterclean** shall provide a training session/s to familiarize the operations team taking over the operating regime of the Floating Treatment Media system during the last maintenance month prior to hand over to the client

MAINTENANCE AND HARVESTING - 3 MONTHLY CHECK

1. Check all anchor points for movement around the anchor.
2. Check all anchor posts for metal fatigue (cracking or broken). Any metal fatigue is covered by the 10 year warranty and guarantee of the signed contract.
3. Check all anchor posts for rust. Any rust showing should be coated with zinc paint such as CRC® Bright Zinc Galvanic Rust Protection. This is available from most hardware stores or see www.crc.co.nz
4. Check all Dee Shackles (if fitted) on anchor posts for wear. Dee shackles are 10mm Stainless Steel 316 and available from most hardware stores or see Anzor: www.anzor.co.nz
5. Check all swaged eyelets and Stainless Steel 316 Braid running from the anchor posts to the FTM for wear. Any broken or loose swaging is covered by the 10 year warranty and guarantee of the signed contract.
6. Check all 10mm Stainless Steel 316 Braid rope fasteners for slipping, wear or breakage. This is covered by the 10 year warranty and guarantee of the signed contract.



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MAINTENANCE AND HARVESTING - 6 MONTHLY CHECK

1. Check all anchor points On the FTM visually from the embankment for **movement** around the **anchor plate** and the **eye bolt**. Any movement is covered by the 10 year warranty and guarantee of the signed contract.
2. Check visually for **weed infestation** and all invasive and problematic weeds to be hand removed or carefully sprayed with **Glyphosate 360** at recommended rates.
3. All spray applications must be carried out by a qualified Approved Handler and SpraySafe certified person. All spraying must be with air intake nozzles and below a wind speed of 5 knots.
4. If the pond has no concrete wave band then careful herbicide application to **control weeds and grasses** on the embankments is advised. The advised Herbicide is **Glyphosate 360** at recommended rates and is available from most farm supplies stores. All spray applications must be carried out by a qualified Approved Handler and SpraySafe certified person. All spraying must be with air intake nozzles and below a wind speed of 5 knots.
5. Check **plant health** on the FTM. Plants should maintain a fresh green appearance but during hotter months and in frosted areas will naturally brown in appearance on the tips. This is natural and the base of the plant should still be dark green and healthy. Any queries should be photographed and emailed to: vern@waterclean.co.nz
Attention: "FTM Plant Health"
6. Check the alignment all FTM layout that it is per original layout. If this is not so any movement is covered by the 10 year warranty and guarantee of the signed contract. This should be photographed and emailed to: vern@waterclean.co.nz
Attention: "FTM Maintenance"
7. If Impermeable Baffles are installed these should be checked for wear and that the floatation is at least 100mm above the water level.



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MAINTENANCE AND HARVESTING - 12 MONTHLY CHECK

1. Check all anchor points On the FTM **manually** from a small boat (pontoon is recommended before regular tinnie type hulls for better stability) for **movement** around the **anchor plate** and the **eye bolt**. Any movement is covered by the 10 year warranty and guarantee of the signed contract.
2. Freeboard checks should be made during the manual anchor point operation. The FTM should always have a freeboard (level above water) of 70mm – 100mm at all times. Any queries should be emailed to vern@waterclean.co.nz
Attention: "FTM Freeboard and Floatation".
3. **Plant harvesting** on the FTM is recommended to ensure the vigour of root and shoot growth post plant maturity (24 months). Plants should be trimmed with a regular weed trimmer to a height of **300mm** above the FTM. Trimmings should be placed back onto the FTM for the first 2 – 3 years to improve the organics and carbon for biological enhancement. Any queries should be emailed to: vern@waterclean.co.nz
Attention: "FTM Plant Harvesting".



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2. OPERATOR GUIDE - SAFE OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

MAINTENANCE AND HARVESTING OF FLOATING TREATMENT MEDIA

MAINTENANCE AND HARVESTING OF FRB

Protective Equipment Required: Calf length Gumboots/Thigh Waders, Safety Glasses, Hearing Protection, High Visibility over Vests and Waterproof Gloves, Sunscreen

It is the responsibility of the supervisor to make sure that the following is available before commencing the work:

- 1 All staff working on site is to have been inducted (by the onsite Project Manager who is the approve Health and Safety officer for this particular project) into the site specific plan, which is for the trimming of plant material on top of the floating pontoons.
- 2 A minimum of 3 staff members are present, at least two of which are trained first aiders and are present at all times.
- 3 All staff personnel on site must have a minimum of Hepatitis A& B injections.
- 4 All personnel are wearing the required PPE at all times as listed above.
- 5 A floatation device is available within 10 m of the 3+ maintenance workers, in the event that someone falls in the water.
- 6 Treaded aluminium is available for use on the site. May be used to spread weight and enhance stability whilst working on the pontoons
- 7 At start of each day a full 20L container of water and antiseptic hand wash is available at the vehicles on site. Paper towels and rubbish receptacle to be provided
- 8 Sipper bottles of clean water are available to workers for dehydration purpose and retained at vehicle.
- 9 At least one cell phone is on site with sufficient battery power, in case of emergency.

HAZARD INDEX	CHECKED
LIFTING AND BENDING	✓
NOISE	✓
FOOT PROTECTION	✓
ALLERGIES	✓
TRIP HAZARDS	✓
WATER/DROWNING	✓
AMENITIES	✓
HANDLING FOOD AND DRINK	✓
STRESS	✓
WORK INEXPERIENCE	✓
RUSHING JOBS	✓
AGGRESSIVE PEOPLE	✓
UNAUTHORISED PEOPLE IN WORK AREAS	✓
SKYLARKING AND PRACTICAL JOKES	✓
WORKING CONDITIONS	✓
ALCOHOL, DRUGS OR MEDICATION	✓
SKIN CANCER	✓
UNFAMILIAR AREAS	✓
SLIPPERY, MUDDY SURFACES	✓
'NO GO' AREAS	✓
WORKING ALONE	✓
ALL WORK LEFT IN AN UNSAFE CONDITION	✓
LOOSE CLOTHING AND LONG HAIR	✓
HEAT	✓
ALL MACHINERY	✓
SCRUB BAR	✓
HAND TOOLS	✓
WORKING IN AND AROUND TREATMENT PONDS	✓
EXISTING CONDITIONS	✓
WINDY CONDITIONS AROUND WATER	✓
EXTREME WEATHER CONDITIONS	✓
SMOKING	✓

CONTROLLING THE HAZARD

Lifting and Bending

The rule to control this hazard is:

- Lift by keeping your back straight and bending your knees.
- Do not lift anything that is too heavy for you; only lift weights that you are able to lift without injuring yourself.
- Never try to lift anything that you do not feel comfortable with or is beyond your capability.

Noise

The rule to control this hazard is:

- Noise is something to be constantly aware of, as it can deprive you of your hearing. This may not be immediately noticeable, but over long exposure periods, it will happen.
- Always wear earmuffs when operating hedge trimmer.

Foot Protection

The rule to control this hazard is:

- Employees must wear calf length gumboots or thigh waders when carrying out the task of using the hedge trimmer to cut vegetation on the floating pontoons.
- Footwear/thigh waders must be in good condition with no holes or cuts.
- Wearing open toed sandals or bare-feet anywhere on the site is expressly forbidden.

Allergies

The rule to control this hazard is:

- If you suffer from allergies, then you must make management aware of this prior to undertaking any work that may create an allergic reaction.

Trip Hazards

The rule to control this hazard is:

- Do not attempt to move quickly across the floating pontoons at any time.
- Always clear the loose freshly cut plant material away from the area you are going to move into, so as to have clear visibility around your immediate standing area.
- Always move trimming forward in one direction. Do not attempt to commence trimming from the centre of the floating pontoons whereby visibility will be poorer.
- Be aware that the physical handling of machinery, tools and clippings can create trip hazards by a temporary loss of balance.
- If you see a trip hazard, remove it and ensure that no one creates any new hazards.
- Always ensure that you have a flat clean surface to stand on.
- Always ensure you stand on the treaded walkway when working on the pontoons.

Water/Drowning

The rule to control this hazard is:

- When working around ponds, special care must be taken to ensure that you do not fall into the water.
- Always have a flotation device located within 10 m of maintenance workers at all times.
- Be very careful especially when you are wearing gumboots/waders, that they do not fill with water and weigh you down.
- Ensure that a minimum of 3 workers are present and within close proximity (10 m) at all times.
- In the event that a person does fall into the water then they must stand up immediately and call to the other 2 workers for assistance. This will include assisting the person with a floatation device to keep them afloat while they remove themselves from the pond (note - pond depth 1.3m).
- Never step closer than within 1.5m of the pond while on the floating pontoon.
- Always have at least 2 first aiders as part of the team of workers and on site at all times during the maintenance process.

Amenities

The rule to control this hazard is:

- Only drink clean tap or bottled water.
- Toilets and showering facilities are not available on the site. The nearest such facilities are to be located
- A container of water is available on the work vehicles and this can be used to initially wash yourself should you become wet from the treatment pond.
- Sufficient disinfectant will be held in the on site, in the vehicles for hand washing and in the case of someone becoming wet from sewage.

Handling Food and Drink

The rule to control this hazard is:

- When you have been working in unhygienic conditions
- Food is not to be consumed while you are working at this site.
- Sipper bottles to be retained in vehicle.
- Hands and lower arms must be thoroughly cleaned ideally using hot water, anti-bacterial soap and a scrubbing brush before any handling or consumption of food. Anti-bacterial soap is carried in the work vehicles along with a supply of water.
- Hands to be thoroughly dried with paper towels before drinking from sipper bottles.
- Do not let food and drink come in contact with any of your clothing or skin that has been exposed to the unhygienic conditions.

Stress

The rule to control this hazard is:

- Stress can be caused by lack of time, pressure from others, health problems and a variety of other factors.
- If you are feeling stressed, talk to the Health & Safety Officer or Management, do not ignore stress.
- There is an extremely helpful document available on the net at www.workinfo.govt.nz which can be made available to you if you have any reason to suppose that you may be suffering from stress or fatigue.

Work Inexperience

The rule to control this hazard is:

- Do not undertake any work that you are not trained to do, or experienced with.
- Do not use any equipment that you are not been trained to use, or not experienced with.

Rushing Jobs

The rule to control this hazard is:

- Employees should never be pressured into completing a task, if to do so is at the expense of health and safety.
- Always allow time for the task to be completed in a safe manner.

Aggressive People

The rule to control this hazard is:

- If confronted by an aggressive person, be polite and refer them to your supervisor or manger. Alternatively leave the area.
- You are not employed to take physical and/or verbal abuse from anyone and it is important that you do not get involved with aggressive people.

Unauthorised People in Work Areas

The rule to control this hazard is:

- Do not let any unauthorised person onto the site, or any fellow employee who is not authorised to be there.
- If an accident should happen, you and the company could be held responsible.

Skylarking and Practical Jokes

The rule to control this hazard is:

- This Company expressly forbids skylarking, practical jokes and fooling around. Any employee that does so may be dismissed immediately.
- If as a result of you behaving in such a manner, a fellow employee should be injured, then you will very likely be faced with a prosecution from the DOL.
- Never fool around under any circumstances!!

Working Conditions

The rule to control this hazard is:

- Always be aware of your working conditions including such things as adequate lighting and air temperature.
- If you have any concerns at all regarding heat, coldness or wind conditions then you must report this immediately to your supervisor or manager.

Skin Cancer

The rule to control this hazard is:

- Melanoma can be caused by the sun's ultraviolet rays. Follow these guidelines to common sense in the sun.
- Wear sun protective clothing (UPF rating 50+) such as long-sleeved shirts and long pants to protect your skin and hats with a minimum 7cm brim. Hats with neck clothes are ideal.
- Use a broad-spectrum sunscreen SPF30+ (that complies with AS/NZS2604) on any skin that is not protected with clothing.
- Take special care on windy and cloudy days. Although you remain cool, you can still burn.
- Sunglasses (that comply with AS/NZS1067.1) should be worn to protect your eyes from the sun. Choose wrap-around, close-fitting sunglasses for the best protection.
- Where workers need protection from physical and chemical injury, tinted safety glasses should be worn.
- Consult your doctor if a freckly spot or mole changes shape, colour or size.

Unfamiliar Areas

The rule to control this hazard is:

- When you are on site, do not wander off into areas you have no business to be.
- Once you know where you are supposed to be working, stay there.

Slippery, Muddy Surfaces

The rule to control this hazard is:

- Areas of this site can become greasy and muddy. Care must be taken that you do not slip when working or walking in the area; always wear the appropriate foot wear .
- WALK CAREFULLY AT ALL TIMES AND DO NOT RUN!

'No Go' Areas

The rule to control this hazard is:

- Some areas on this site are considered "NO GO" areas because of the potential for danger.
- Unless authorised to do so, employees should stay within their work areas.
- If you have to go into another area, make sure that you are aware of the hazards contained in that area and only after receiving authorisation.

Working Alone

The rule to control this hazard is:

- Never enter this site alone. It is strictly against Company Policy to do so.
- At any time, always ensure that there is a other personnel(at least 2 others) working within a 10m radius of you when undertaking any of the harvesting process.

All Work left in an Unsafe Condition

The rule to control this hazard is:

- Ensure that your work is left in a totally safe condition.
- Ensure that all aluminium planks have been removed from site when leaving the site.
- Ensure that all machinery /tools and equipment are placed back by the vehicle when not in use to avoid the chance of creating a tripping hazard.
- Never leave the site while works are partly completed without erecting sufficient warning/danger signage.

Loose Clothing and Long Hair

The rule to control this hazard is:

- No loose clothing or hanging long hair is allowed around any moving equipment. This particularly applies to the hedge trimmer operator.

Heat

The rule to control this hazard is:

- When working in hot (22+ degrees), drink plenty of fluids and take a break regularly (30 min intervals) to avoid stress and fatigue.

All Machinery

The rule to control this hazard is:

- All machinery and equipment on the site has a potential for serious harm accident.
- Only employees specifically instructed to do so are permitted to operate, or be on, any of the Company's equipment and then only if you are either experienced or specifically trained with that particular machine.
- Most machinery has manufacturers' instructions, follow them and ensure that the equipment is in safe working order.
- Follow all safe work practices and use safety equipment, leaving all guards on.
- Do not use any machinery that has guards missing or broken guards; work alone with machinery; adjust machinery while it is still operating or while it is not in a rested state, or use any machinery in poor light.
- Report any faults immediately. Ensure that any faulty machinery is turned off first, and then place an 'Out Of Order' sign on it.

Hedge Trimmer

The rule to control this hazard is:

- Only trained and experienced employees are permitted to use the hedge trimmer.
- Make sure the hedge trimmer is in good condition and the blades are sharp.
- Only operate the hedge trimmer when safety straps have been fastened.
- Safety glasses, hearing protection and gloves must be worn when using the hedge trimmer.
- When using the hedge trimmer around other people always be aware of where they are and don't move the hedge trimmer into them.
- Never operate the hedge trimmer within 4m of other personnel.
- Always operate the hedge trimmer in one direction beginning from the pond edge and working out.
- Never step off the aluminium planks when operating the hedge trimmer.
- When you have finished using the hedge trimmer turn it off before putting it down. Do not leave it running unattended.

Hand Tools

The rule to control this hazard is:

- All hand tools should be in good working order. Worn tools should be replaced.
- Make sure they are the correct tools for the work you are doing.
- Keep all hand tools in a tidy state and do not leave them anywhere where they could create a trip hazard.
- Do not exert too much pressure on tools, or put extra leverage onto them.
- Wear all the required PPE for the job you are doing.
- Always check the material you are working on is secure and stable.

Existing Conditions

The rule to control this hazard is:

- Always assess all current conditions, before starting work and do not put yourself or anyone else at risk.
- Leave a site immediately, if conditions change and you are concerned about your safety.

Windy Conditions around Water

The rule to control this hazard is:

- Do not try to work on the floating pontoons if there is any concern about your safety due to wind and wave action caused by wind.
- Windy conditions are dangerous and can cause accidents due to a lack of balance. Do not endanger yourself if the weather conditions change for the worse and become a concern.
- Aerosol or wind borne sewage caused by strong wind and wave action is extremely dangerous. If this becomes apparent then; Stop work immediately and find a safe environment.

Extreme Weather Conditions

The rule to control this hazard is:

- Never work in extreme weather conditions. These include torrential rain or gusty to gale force winds.
- If you have any concern about your health and safety due to extreme weather conditions, seek shelter away from the site immediately.

Smoking

Workers are not permitted to smoke when working on the pontoons as this will expose the person to ingesting pollutants from his/her hands.

REFERENCE PLANS

FIGURE A:	FTM MODULE STRUCTURE FIGURE
FIGURE B:	MAINTENANCE FIGURE
FIGURE C:	MAINTENANCE AND HARVESTING ELEVATION