KENNEDY POINT MARINA
WAIHEKE ISLAND

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Date: 09/10/2023
CST60082321
Certifier: Yashika Joshi
Related conditions: C85
Revision:

Stormwater Operation & Maintenance Plan

Kennedy Point Marina

September 2023

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Date: 09/10/2023
CST60082321
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Acknowledgments

This Stormwater Operation & Maintenance Plan has been prepared by Kennedy Point Boatharbour Limited (KPBL) in collaboration with the following:

Contributor	Personnel
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Definition of terms

Marina	The marina facilities located at Kennedy Point Bay, Waiheke Island constructed and operated pursuant to the Resource Consent
Resource Consent	Coastal permit CST60082321-B

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1. Introduction

This Stormwater Operation & Maintenance Plan (**SOMP**) relates to the stormwater management system installed at Kennedy Point Marina and how it will be operated and maintained to ensure environmental effects are minimised.

Condition 85 of the Resource Consent requires the SOMP to include, as a minimum:

(a) A programme for regular maintenance and inspection of the stormwater management system;

(b) A programme for the collection and disposal of debris and sediment collected by the stormwater management devices or practices;

(c) A programme for post-storm inspection and maintenance;

(d) A programme for inspection and maintenance of any outfalls;

(e) General inspection checklists for all aspects of the stormwater management system, including visual checks; and

(f) Details of who will hold responsibility for long-term maintenance of the stormwater management system and the organisational structure which will support this process.

2. Marina Stormwater System

The Marina's stormwater management system comprises two main elements:

A. Horizontal concrete surfaces where vehicles have access (access wharf, carpark pontoons), designed with cross fall to gravity drain surface water to custom designed stormwater filter boxes.

B. Stormwater filtration devices (Stormwater 360 storm filters) within each of the filter boxes to filter the receiving water and discharge direct to coastal water.

Due to the location and proposed use of the Marina structures in question, no significant sediment or vegetative matter load is expected to the stormwater filter boxes.

Plans for the various components of the stormwater system are included in Appendix 1.

3. Stormfilter Operation & Maintenance

Stormwater360 have prepared the *Kennedy Point Marina StormFilter Operations Maintenance Guidelines* setting out all relevant details for the operation and maintenance of the stormfilters installed as part of the Marina stormwater system. Refer Appendix 1.

4. Stormwater Collection System Maintenance

Marina Wharf

The surface of the Marina wharf has been finished to fall to the corner of the wharf where the stormfilter box is located, thereby directing all stormwater falling on the wharf to this device.

Maintenance of this surface will comprise daily checking by Marina staff to ensure that there is no loose or other unexpected matter on the concrete surface (including within the rubbish and plant room enclosure)

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that might obstruct stormwater flow to the stormfilter box, or be transported as part of any surface flow to the stormfilter box. Any matter encountered will be collected and disposed of.

Marina Carpark

The Marina carpark pontoons have been finished with a central high-point that ensures surface water flows to their edges and then into a stormwater channel cast into the concrete that connects to the inlets to the stormfilter boxes.

Maintenance of the carpark surface and stormwater channels will comprise daily checking by Marina staff to ensure that there is no loose or other unexpected matter on the concrete surface or in the channels that might obstruct stormwater flow to the stormfilter boxes, or be transported as part of any surface flow to the stormfilter boxes. Any matter encountered will be collected and disposed of.

5. Condition 85 Matters

The following table discusses the matters required to be addressed by Condition 85 of the Resource Consent.

1	*A programme for regular maintenance and inspection of the stormwater management system*	Appendix 1 sets out the maintenance and inspection programme for the stormwater 360 storm filters. All other surfaces that comprise part of the stormwater collection system will be inspected daily by marina staff and any loose or unexpected matter removed collected and disposed of.
2	*A programme for the collection and disposal of debris and sediment collected by the stormwater management devices or practices*	Debris and sediment collected in the stormfilters will be removed by hand or wet-vac and disposed of to waste. Debris etc collected from the stormwater collection surfaces will be disposed of to waste.
3	*A programme for post-storm inspection and maintenance*	Marina staff will inspect all components of the stormwater system after a storm event and remove any debris to waste. If the stormfilters require specific maintenance, the Marina's contracted stormfilter maintenance company will be contacted.
4	*A programme for inspection and maintenance of any outfalls*	Refer 1 and 3 above.
5	*General inspection checklists for all aspects of the stormwater management system, including visual checks*	Refer 1 and 3 above. Inspections of all stormwater components by Marina staff will form part of daily Marina inspection protocols.

6	*Details of who will hold responsibility for long-term maintenance of the stormwater management system and the organisational structure which will support this process*	KPBL will be the owner and operator of the stormwater system and obliged to implement this SOMP under the Resource Consent. In the short term, KPBL will contract a specialist third party to inspect, clean and replace stormfilter cartridges as recommended by Stormwater 360. For the longer term, KPBL intends to work with the designer / supplier to gain the appropriate accreditation so that it can maintain the Marina's stormfilters 'in-house'.

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Appendix 1 – *Kennedy Point Marina StormFilter Operations Maintenance Guidelines,* Stormwater 360

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Stormwater360®
BETWEEN SKY AND SEA

StormFilter

Operation & Maintenance Guidelines

V4.3 January 2016

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INTRODUCTION

This document, and the information within, are provided to be used only as a guide. This document is intended to provide general information for the operation and maintenance of the StormFilter device ("the product"). This document is not intended to be comprehensive health and safety guidelines for the operation and/or maintenance of the StormFilter device, which are the responsibility of the owner of the device.

Users of this document are encouraged to consult professional advice before taking any course of action related to information, ideas or opinions expressed in this document.

Disclaimer

Information in this document is subject to change without notice and does not represent a commitment on the part of Stormwater360 New Zealand. Stormwater360 New Zealand makes no representations or warranties, implied or otherwise, that, amongst others, the information available from this document are free from errors or omissions.

Nothing in this document should be construed as an expressed warranty or an implied warranty of Merchantability or fitness for any particular purpose.

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SECTION A Site Specific Details

This section is to be filled out by the asset owner following installation of StormFilter devices. For assistance in filling out this form please contact our Maintenance Manager via 0800 STORMWATER. Please return completed forms via email to maintenance@stormwater360.co.nz.

Project Name: Kennedy Point Marina

Project Address: Waiheke Marina, 143 Donald Bruce Road, Surfdale

Resource Consent Number: CST60082321-B

Building Consent Number: BCO10308885 (Wharf); EXE21586089 (Carpark)

Consent/Site Owner: Kennedy Point Boat Harbour Limited

Consent/Site Owner Address: Waiheke Marina
143 Donald Bruce Road
Surfdale
Waiheke Island 1081

Table; Summary of Installed StormFilters

StormFilter Reference #	StormFilter Model	Number of Cartridges	Cartridge Height (cm)	Media Type	Restrictor Disc Size (mm)	Max Catchment Area (m²)	Estimated Maintenance Frequency (Months)
4262/SF1	Custom StormFilter	02	30	Perlite	25	454	18 Months
4262/SF2	Custom StormFilter	02	30	Perlite	25	454	18 Months
4262/SF3	Custom StormFilter	02	30	Perlite	25	454	18 Months
4262/SF4	Custom StormFilter	02	30	Perlite	25	454	18 Months
4262/SF5	Custom StormFilter	02	30	Perlite	25	454	18 Months
4262/SF6	Custom StormFilter	02	30	Perlite	25	454	18 Months
4262/SF7	Custom StormFilter	02	69	Perlite	27.6	1,022	18 Months

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SECTION B As Built Drawings

This section is to be filled out by the asset owner following installation of StormFilter devices. For assistance in filling out this form please contact our Maintenance Manager via 0800 STORMWATER. Please return completed forms via email to maintenance@stormwater360.co.nz.

The following as-built drawings are to be provided to Stormwater360 to include within this section;

As-Built Drawings	Supplied
Site Plan shown location of each StormFilter Device	YES / NO
Catchment Plan for each StormFilter	YES / NO
Long-section drawings of site pipe network	YES / NO
Product Drawing (To be supplied by SW360)	YES / NO

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The StormFilter is a passive, flow-through stormwater filtration system. It consists of vaults that house rechargeable cartridges filled with a variety of filter media. The filter systems are installed in-line with storm drains. The StormFilter works by passing stormwater through media-filled cartridges, which trap particulates and adsorb materials such as dissolved metals and hydrocarbons. After being filtered through the media, the treated stormwater flows into a collection pipe or discharges into an open channel drainage way. StormFilters are offered in three different configurations: cast-in-place, precast and linear. The precast and linear models utilize pre-manufactured vaults. The cast-in-place units are customized for larger flows and may be either covered or uncovered underground units.

C.1 Purpose

The StormFilter is a passive stormwater filtration system designed to improve the quality of stormwater runoff from the urban environment before it enters receiving waterways.

Through independent third-party studies, it has been demonstrated that the StormFilter is highly effective for treatment of first flush flows and design flows during the latter part of a storm. In general, the StormFilters efficiency is highest when pollutant concentrations are highest. The primary target pollutants for removal are sediments (TSS), soluble metals, phosphorus, nitrogen, and oil and grease.

C.2 Sizing

The StormFilter® is typically sized to treat the peak flow of a water quality design storm as it passes through the filter. The peak flow is determined by calculations based on the contributing watershed hydrology and using a design storm magnitude. The design storm is usually based on the regulatory requirements set by the local stormwater management agency. The particular size of a StormFilter is determined by the number of filter cartridges (see Figure 1) required to treat the peak stormwater flow. As the StormFilter is available in different cartridge sizes, the peak design flow for each cartridge is a function of available filter area. Each cartridge is designed to treat a maximum of 1.4 Litres/second per square meter of filter area. Peak flows for the varying cartridge heights are as follows:

Table 1; Cartridge Model and Peak Flow

Cartridge Height	*Peak Design Flow*
69 cm	1.4 L/s
46 cm	0.95 L/s
30 cm (low drop)	0.63 L/s

Alternative design methods are the solids-based or the detention design method. Solids-based designs utilize the known loading capacity of the StormFilter to size systems in accordance with a desired maintenance interval. The detention design method allows use of less cartridges than is required to treat the peak of the water quality design storm as additional detention is provided either upstream or in an oversized vault. The additional detention required is calculated by routing the water quality design storm through the chosen number of cartridges.

Because of the highly porous nature of the granular filter media, the flow through a newly installed cartridge is restricted using an orifice disc to ensure adequate pollutant-media contact time.

C.3 Basic Function

The StormFilter is designed to siphon stormwater runoff through a filter cartridge containing media. The variety of media available can be designed to act as a mechanical filter to remove sediments, as an ion exchanger to remove dissolved heavy metals, and as an absorber to remove oils and greases.

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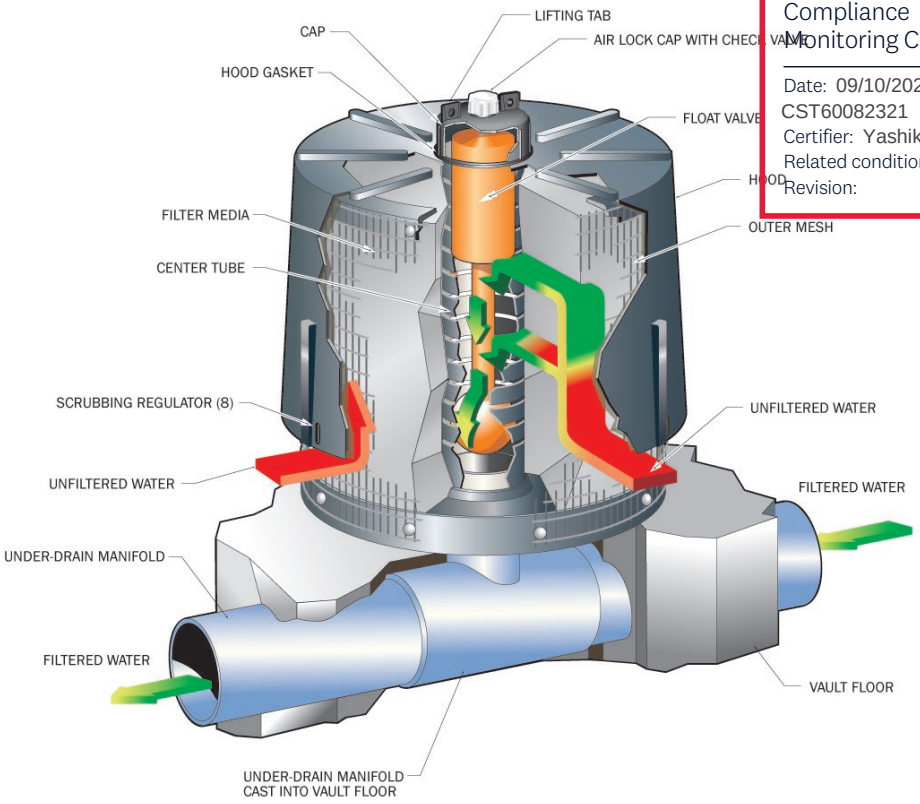


Figure 1: StormFilter Cartridge Detail

C.4 Priming System Function

The treated stormwater collects in the centre tube of the cartridge, which is equipped with a self-priming siphon system. Figure 1 illustrates this system. The key component of the system is the plastic float. The float consists of a ball located at the base leading up to a larger portion, which provides increased buoyancy. Initially the ball rests in a seat effectively closing off the port to the drainage manifold.

As a result, the filter fills the centre drainage tube until the water level has risen high enough to purge the air from the filter cartridges and displace the float. At this point the float pulls loose and allows the filtered water to drain out through the manifold. This effectively "primes" a siphon within the drainage tube and greatly increases the potential across the filter. The priming system increases StormFilters ability to be loaded with sediment. A related feature is the cartridge "hood". This hood maintains the siphon effect by preventing air from being drawn into the cartridge until the external water level drops below the bottom of the hood.

Cartridges are connected to the manifold with a plastic connector. Since some media used is potentially buoyant, a threaded connector affixed to the manifold with compression bolts is necessary to ensure the cartridge isn't lifted out of place. For the heavier leaf media, a slip connector is used.

The StormFilter is also equipped with flow spreaders that trap floating debris and surface films, even during overflow conditions. Depending on individual site characteristics, some systems are equipped with high and/or low flow bypasses. High flow bypasses are installed when the calculated peak storm event generates a flow that overcomes the overflow capacity of the system. This is especially important for precast systems. Low flow bypasses are sometimes installed to bypass continuous inflows caused by ground water seepage, which usually do not require treatment. All StormFilter units are designed with an internal overflow. The overflow operates when the inflow rate is greater than the infiltration capacity of the filter media.

END OF SECTION C

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SECTION D Maintenance

The primary purpose of the StormFilter is to filter out and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness. Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. To assist the owner with maintenance issues, Stormwater360 New Zealand (SW360) provides detailed Operation & Maintenance Guidelines with each unit.

SW360 can provide maintenance services completely, or in part. Available services include tracking of installed systems, advising the system's owner of maintenance needs, and notification of the regulatory agency once the system has been maintained. It is recommended that the StormFilter is inspected six months after installation of the cartridges to ensure its correct installation and that it is operating as designed.

Maintenance is usually performed in the dryer periods to rejuvenate the filter media and prepare the system for the next rainy period. Maintenance activities can also be required in the event of a chemical spill or excessive sediment loading due to site erosion or extreme storms. It is good practice to inspect the system after severe storm events.

D.1 Maintenance

- Cartridge Exchange – Stormwater360 provide cartridges to a trained and approved maintenance company, refurbished cartridges filled with the appropriate approved filter media are exchanged with emptied exhausted cartridges from your site.

Further information on these maintenance services can be found on the SW360 website (http://www.stormwater360.co.nz/services/maintenance/).

Please contact our maintenance team at maintenance@stormwater360.co.nz or 0800 STORMWATER for a list of approved maintenance companies.

D.2 Health & Safety

All maintenance activities to be carried out on the device are recommended to be undertaken in accordance with appropriate health and safety guidelines, which are the responsibility of the asset/device owner.

This device is considered to be a confined space. Entry into the device should be regarded as a ‘last resort’ to complete activities unable to be completed without entry. If entry is required, confined space entry procedures are recommended to be implemented in accordance with the health and safety guidelines mentioned above.

Sources of ignition and smoking should not be permitted when undertaking inspections and maintenance due to the possibility of volatilised hydrocarbons and the associated explosion risk.

D.3 Maintenance Activities

Maintenance typically includes cartridge recharging and may involve disposal of materials that require consideration of regulatory guidelines. Depending on the particular unit configuration and equipment used, maintenance may require an understanding of Occupational Health and Safety (OH&S) rules. Table 3 summarizes the primary activities associated with StormFilter maintenance.

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Table 2; StormFilter Maintenance Activity

Facility Component Requiring Maintenance	Maintenance Activity	When Maintenance Activity Is Required	Expected Facility Performance After Maintaining
StormFilter® Cartridges and Containment Structure	Trash and Debris Removal	Floatable objects or other trash is present in the filter. Remove to avoid hindrance of filtration and eliminate unsightly debris and trash.	Permanent removal from storm system.
	Cartridge Replacement and Sediment Removal	Media has been contaminated by high levels of pollutants, such as after a spill.	New media is able to effectively treat stormwater.
Drainage System Piping	Flushing with Water	Drainage system is obstructed by debris or sediment.	Outflow is not restricted.

D.3.1 Timing

Two scheduled inspections/maintenance activities are recommended for the first three years to determine required maintenance frequency. Once site maintenance requirement and operation is established, one annual scheduled inspection is sufficient. During routine inspection, the maintenance requirement is determined and, if required, samples of the sediments and media are obtained. The next scheduled date is to perform maintenance activities (replacement of the filter cartridges and associated sediment removal). In addition to the scheduled activities, it is important to check the condition of the filter after major storms to check for damage caused by high flows and to check for high sediment accumulation, which may be caused by localised erosion in the drainage area. It may be necessary to adjust maintenance activity scheduling depending on the actual operating conditions encountered by the system.

D.3.2 Frequency

The primary factor controlling timing of maintenance for the StormFilter is sedimentation. A properly functioning system will remove solids from water by trapping these particulates within the porous structure of the media. The flow through the system will naturally decrease as more and more solids are trapped. Eventually the flow through a system will be low enough to require replacement of the cartridges. Sediment should be removed from upstream trapping devices on an as needed basis to prevent material from being re-suspended and discharged to the system.

Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction should be inspected and maintained more often than those in fully established areas. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after large storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual filter. It is recommended that the maintenance agency develop a database to properly manage StormFilter maintenance programs.

Prior to the development of the maintenance database, maintenance frequencies (Table 4) should be followed.

Frequencies should be updated as required. The recommended frequency for inspection is two times per year for the first three years for the system until maintenance requirement and operation is established, then one annual scheduled inspection is sufficient. Also, StormFilter units should be inspected after all major storms. Sediment removal on an annual basis is recommended until further knowledge is gained about a particular system.

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Table 3; Maintenance Activity Frequency

	PRE-INSPECTION (Times / Year)	PREVENTATIVE MAINTENANCE (Months)	CORRECTIVE MAINTENANCE
StormFilter	• First 3 years – 2 ea. annual inspections are recommended. • Subsequent years 1ea annual inspection. • Major Storms – following rain events of 25mm over 24 hours.	Includes regularly scheduled inspections and activities to keep the device in good working order and prevent issues from arising. Refer to Table 1 SECTION A above for site Specific StormFilter Details	Includes emergency or non-routine activities requiring reactive action to be implemented to repair the device. As required as per the inspection report.

D.3.3 Crew Requirements

Table 5 lists the anticipated crew requirements for maintenance operations. Removal of water and sediments during major maintenance activities can be accomplished using either a pump and water truck or a vacuum truck. All applicable OH&S and disposal regulations should be followed. A general description of the maintenance activities follows.

Table 4; Anticipated Crew Requirements

	Inspection	Preventative Maintenance i.e. Scheduled Sediment Removal and Cartridge Replacement	Corrective Maintenance:
Labourer	1	1	1
Skilled Worker	1	1	1
Vacuum/Water Truck Operator		1	1
Total	**2***	**3***	**3***
Special Requirements	Knowledge of Proper StormFilter operation and Function	Knowledge of Disposal Requirements Cartridge Removal and Installation Procedures	Case by Case Basis. Supported by SW360 Engineers

** This device is considered to be a confined space. Entry into the device should be regarded as a 'last resort' to complete activities unable to be completed without entry. If entry is required, confined space entry procedures are recommended to be implemented in accordance with the health and safety guidelines.*

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D.4 Typical Equipment Required for Maintenance Activities

Typical equipment required for conducting maintenance is shown in

Table 6. Some of the materials listed are suggestions rather than requirements. It should be noted that there is more than one way to accomplish some tasks. Owners with available labour and equipment resources may desire to use alternative methods. However, it is advisable that guidance from Stormwater360 be obtained prior to using alternative techniques.

Table 5; Maintenance Equipment Requirements

Maintenance Equipment Required	
Pre- Maintenance Inspection	**Maintenance Cartridge Replacement**
Safety Equipment*: First aid, cones, barricades, flagging, flares, tape, vests, hard hats.	Safety Equipment*: First aid, cones, barricades, flagging, flares, tape, vests, hard hats.
Work Clothes: Rubber boots, overalls, and gloves.	Work Clothes: Rubber boots, overalls, and gloves.
Door Bolt, Wrench, proprietary lifters (e.g. Gatic) and Miscellaneous Tools.	Door Bolt, Wrench, Penta Socket and Miscellaneous Tools.
Tape Measure	Tape Measure
Flashlight	Flashlight
Record Keeping Forms	Record Keeping Forms
Trash/Debris Container	Vacuum Truck
	Replacement Cartridges
	Cartridge Hauling Truck
	Crane, Tripod and Hoist, or Other Lifting Device (150kg minimum capacity)
	Shovels
	Extra PVC or ABS cartridge connectors
	Spare Flow Restrictor disks
	Trash/Debris Container
	Vault Inlet Pipe Plug
	Dolly
	PVC Pipe Cutter
	Ladder
	Cartridge Installation and Removal Sling

*** Confined space equipment may be required for vault entry. This equipment must be used by personnel with the appropriate OH & S training. This equipment typically includes: Atmospheric testing devices, atmospheric purging and ventilating devices, and entry, exit, and rescue assisting devices.**

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D.5 Methodology

D.5.1 Pre-Maintenance Inspection

The primary goal of the maintenance inspection is to assess the condition of the cartridges relative to the level of sediment loading. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, large amounts of sediments should be present and very little flow will be discharging from the drainage pipes. It is likely that the cartridges need to be replaced. Maintenance inspection will typically involve the steps below. However, if it appears that a spill of some type has occurred, the local hazard control agency and Stormwater360 should be notified immediately. **In the case of a spill, the worker should abort maintenance activities until the proper guidance has been obtained**.

D.5.1.1 Steps

1. Pre-Maintenance inspection to be performed by a skilled worker familiar with StormFilter devices.
2. If device is located within a road carriageway, arrange for traffic management to be provided by a competent provider.
3. Set up safety equipment and barriers to isolate public from work zone and protect pedestrians from fall hazards presented by access cover.
4. Temporary (removable) ladders to be used for access into the StormFilter device.
5. Inspect the external condition of the device and take notes concerning defects/problems.
6. Open the access cover to the device and allow the vault to air out for 5-10 minutes.
7. Undertake a visual inspection from the top to check if there is sediment within vault and ponded water. Assess whether it is necessary and safe to enter the device. *note* entry to device is required to determine the quality of the cartridge media.

   Confined space entry procedures are recommended to be implemented in accordance with your company's health and safety guidelines.
8. **When confined space entry is required to access the StormFilter systems. Please ensure that appropriate Confined Space entry training and subsequent certification has been undertaken and valid, and work procedures are strictly adhered to. If you are unsure, do not enter the vault and contact Stormwater360 via 0800 STORMWATER.**
9. Take notes about the external and internal condition.
10. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
11. If the visit is during a storm, make the flow observations discussed above.
12. Close and fasten the access cover, remove safety equipment and barriers.
13. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system. Refer section D.5.1.2 for sample report.
14. Arrange for traffic management to be disestablished.
15. Review the condition reports from the previous maintenance visits and schedule for cartridge replacement if needed.

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STORMFILTER INSPECTION REPORT

SITE DETAILS

PROJECT NAME	JOB ID # UNIT ID #		INSPECTION DATE (DD/MM/YYYY)
PROJECT ADDRESS			GPS CO-ORDINATES (LAT. , LONG.)
UNIT SIZE (eg SF69-03-MH-1215-PER)	MEDIA TYPE	ACCESS COVER TYPE	UNIT DEPTH

UNIT OBSERVATIONS

LAST MAINTAINED (DD/MM/YY)	MONTHS IN SERVICE	INLETMANHOLES	OUTLET MANHOLES

FOREBAY

INLET PIPE(S) STATE INLET PIPE SILT	FOREBAY WATER DEPTH	FOREBAY SILT DEPTH	FOREBAY SILT TYPE
INLET SKI JUMP STATE	INLET SPREADER STATE	INLET DISSIPATOR STATE	OTHER INLET PARTS

TREATMENT BAY

CARTRIDGES ON SPIGOT / OFF SPIGOT	CARTRIDGES SUBMERGED	CART MESH BLOCKED	MEDIA CLEAN / BLOCKED
TREATMENT BAY SEDIMENT TYPE	TREATMENT WATER DEPTH	TREATMENT BAY SILT DEPTH	OIL/GREASE
AIR RELIEF VALVES STATE	TOP CAP O-RING STATE	SOCK RUBBER BAND STATE	

OUTLET BAY

OUTLET PIPE(S) STATE BLOCKED?	OUTLET SPREADER STATE	OUTLET BAY SILT DEPTH	OTHER PARTS STATE?

UNIT SURROUNDS

OIL & GREASE SOURCE		COMMENTS
SEDIMENT BUILD-UP SOURCE		COMMENTS
SOIL EROSION SOURCE		COMMENTS

RECOMMENDATIONS

CLEAN REQUIRED:
NEXT INSPECTION:
REPAIRS REQUIRED:
NOTES: Device had not been inspected or maintained since installation in 2008. This device has a large amount of sediment within the vault and is unable to operate as designed.

AUTHOR	TITLE	COMPANY	DATE

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D.5.2 Cartridge Replacement

Filter cartridge replacement typically involves the steps below. However, if it appears that a spill of some type has occurred, the local hazard control agency and Stormwater360 should be notified immediately. **In the case of a spill, the worker should abort maintenance activities until the proper guidance has been obtained.** Depending on the configuration of the particular system, a worker may be required to enter the vault to perform some tasks. If vault entry is required, OH & S rules for general confined space entry must be strictly adhered to. Filter cartridge replacement should occur during dry weather and it may be necessary to plug the filter inlet pipe if base flows exist. Standing water present in the vault should be regarded as polluted and contained during this operation by temporarily capping the manifold connectors.

D.5.2.1 Steps (With Vacuum Truck)

1. Depending on the particular unit, one or two utility workers and a hauling truck operator will deliver the replacement cartridges to the site. Information is available from Stormwater360 concerning how to obtain the replacement cartridges.

2. If device is located within a road carriageway, arrange for traffic management to be provided by a competent provider.

3. Set up safety equipment and barriers to isolate public from work zone and protect pedestrians from fall hazards presented by access cover.

4. Inspect the external condition of the device and take notes concerning defects/problems.

5. Open the access cover to the device and allow the vault to air out for 5-10 minutes.

6. Undertake a visual inspection from the top to check if there is sediment within vault and ponded water. Assess whether it is necessary and safe to enter the device. *note* entry to device is required to determine the quality of the cartridge media.

   Confined space entry procedures are recommended to be implemented in accordance with your company's health and safety guidelines.

7. **When confined space entry is required to access the StormFilter systems. Please ensure that appropriate Confined Space entry training and subsequent certification has been undertaken and valid, and work procedures are strictly adhered to. If you are unsure, do not enter the vault and contact Stormwater360 via 0800 STORMWATER.**

8. Make notes about the external and internal condition.

9. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.

8. Ensuring safe working procedures are met, off load the replacement cartridges (16-60kgs each) and set aside.

9. Temporary (removable) ladders to be used for access into the StormFilter device.

10. Remove the top cap (threaded), upper seal and float from the cartridge. Repeat procedure for every cartridge within StormFilter vault. Place items in a large plastic container to be lifted from the vault.

11. Move the Vacuum truck near the StormFilter vault on the downstream side. Be sure that the Vacuum truck is not too close to the vault so as the fumes will not enter the vault. Make sure that the last 500mm of the nozzle is approx. 100-125mm in outside diameter.

12. Feed vacuum nozzle into cartridge bay and start vacuum truck. Remove cartridge hood and place nozzle directly onto filter media. Completely remove media from each cartridge and repeat process for every cartridge in vault.

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13. Once completed unthread cartridges from vault floor and place hood back on cartridges

14. Using the appropriate lifting cap, attach the cable and remove the cartridge (up to 15kgs. each) from the vault. Personnel standing under suspended cartridges is strictly prohibited. Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the maintenance contractor.

14. Set the used cartridge aside or load onto the hauling truck.

15. Repeat steps 11 to 13 until all cartridges have been removed.

16. Remove deposited sediment from the floor of the vault and, if large amounts are present, from the forebay. This can be accomplished by using the Vacuum truck

17. Once the sediments are removed, it is necessary to assess the condition of the vault, particularly the manifold and the connectors. These are either short sections of 2-inch schedule 50 PVC, threaded schedule 80 PVC, or ABS deck mount stubs that should protrude above the floor of the vault. If required, apply a light coating of FDA approved silicon grease to the outside of the exposed portion of the connectors. This ensures a watertight connection between the cartridge and the drainage pipe. Replace any damaged connectors.

18. Using the boom, crane, or tripod, lower and install the new cartridges (typically 16-17kgs. for 46cm perlite cartridges. 20-22kgs. For 69cm perlite cartridges). Once again, take care not to damage connections.

19. Close and fasten the access cover and remove safety equipment.

20. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loadings of other materials to the system.

21. Finally, dispose of the residual materials in accordance with applicable regulations. Make arrangements to return the used cartridges to Stormwater360.

D.5.2.2 Steps (Without Vacuum Truck)

1. Depending on the particular unit, one or two utility workers and a hauling truck operator will deliver the replacement cartridges to the site. Information concerning how to obtain the replacement cartridges is available from Stormwater360.

2. If device is located within a road carriageway, arrange for traffic management to be provided by a competent provider.

3. Set up safety equipment and barriers to isolate public from work zone and protect pedestrians from fall hazards presented by access cover.

4. Inspect the external condition of the device and take notes concerning defects/problems.

5. Open the access cover to the device and allow the vault to air out for 5-10 minutes.

6. Undertake a visual inspection from the top to check if there is sediment within the vault and ponded water. Assess whether it is necessary and safe to enter the device. *note* entry to device is required to determine the quality of the cartridge media.

   Confined space entry procedures are recommended to be implemented in accordance with your company's health and safety guidelines.

7. **When confined space entry is required to access the StormFilter systems. Please ensure that appropriate Confined Space entry training and subsequent certification has been undertaken and valid, and work procedures are strictly adhered to. If you are unsure, do not enter the vault and contact Stormwater360 via 0800 STORMWATER.**

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8. Make notes about the external and internal condition.

9. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.

10. Remove large loose debris and trash using a pole with a grapple or net on the end.

11. Ensuring safe working procedures are met, off load the replacement cartridges (16-60kgs each) and set aside.

12. Temporary (removable) ladders to be used for access into the StormFilter device.

13. Using the appropriate lifting cap, attach the cable from the boom, crane, or tripod to the cartridge being removed. Personnel standing under suspended cartridges is strictly prohibited. For more information contact Stormwater360. This activity may require that workers enter the vault* to remove the cartridges from the drainage system and place them under the vault opening for lifting. Note that cartridges require unscrewing from their threaded connectors. Take care not to damage the manifold connectors. This connector should remain installed in the manifold and capped if necessary.

    Note: * Confined space entry may be required on StormFilter systems. In this case, please ensure that appropriate Confined Space entry training and subsequent certification has been undertaken and valid, and work procedures are strictly adhered to. If you are unsure, do not enter the vault and contact Stormwater360 immediately.

14. Remove the cartridge (up to approx. 60kgs. each for 46cm Perlite/Zeolite mix saturated & occluded cartridges) from the vault. Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner unless maintenance activities are being performed by Stormwater360 and damage is not related to discharges to the system.

15. Set the used cartridge aside or load onto the hauling truck.

16. Continue steps 10 through 12 until all cartridges have been removed.

17. Remove deposited sediment from the floor of the vault and, if large amounts are present, from the forebay. This can usually be accomplished by shovelling the sediment into containers which, once full, are lifted mechanically from the vault and placed onto the hauling truck. In some cases of extreme sediment loading, especially if the sediment is saturated, a vacuum truck may be required.

18. Once the sediments are removed, it is necessary to assess the condition of the vault, particularly the manifold and the connectors. These are either short sections of 2-inch schedule 50 PVC, threaded schedule 80 PVC, or ABS deck mount stubs that should protrude above the floor of the vault. If required, apply a light coating of FDA approved silicon grease to the outside of the exposed portion of the connectors. This ensures a watertight connection between the cartridge and the drainage pipe. Replace any damaged connectors.

19. Using the boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.

20. Close and fasten the access cover and remove safety equipment.

21. Make notes about the local drainage area relative to ongoing construction, erosion problems, or high loadings of other materials to the system.

22. Finally, dispose of the residual materials in accordance with applicable regulations. Make arrangements to return the used cartridges to Stormwater360.

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Revision: SF46-09-VF-421515-PER

Vault Maintenance Data Sheet

Site Details

Date: 19/01/2016 **Location:** 88 Carbine Road **System Size:** 421515-PER

System: Precast Linear Cast in Place (circle option) **Personnel**

Equipment Used **Road Cones, Truck Warning Lights, Gas Detector, Safety Harnesses, Winch and Pulley, Ear Muffs, Gloves, Steel Cap Gumboots, Disposable Overalls**

System Observations

Media Month in service	94	Oil & Grease in Forebay	N/A
Forebay Sediment Depth	N/A	Vault Floor Sediment	150mm
Structural Damage	None	Flow from Pipes	Good
Carts Submerged	None	Submerged Depth	N/A

Drainage Area Report

Excessive Oil & Grease	No	Source	N/A
Sediment Build up	No	Source	N/A
Erosion of Landscaping	None	Source	N/A

Cartridge Replacement Activities (check off when completed & give description)

Remove Trash and Debris	Some litter removed	Replace Cartridges	9
Sediment Removed	±1000kg	Minor Structural Repairs	N/A

Sediment Disposal Methods **Council Approved Facility**

Other Details

Items requiring further attention None

Latitude **Longitude**

Comments Device needs regular maintenance.

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D.6 Related Maintenance Activities (Performed on an as-needed basis)

StormFilter units are often just one of many components in a more comprehensive stormwater drainage and treatment system. The entire system may include catch basins, detention vaults, sedimentation vaults and manholes, detention/retention ponds, swales, artificial wetlands, and other miscellaneous components. In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities. In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil and grease loading, and discharges of inappropriate materials.

D.7 Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in a manner that will not allow the material to affect surface or ground water. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily travelled roads. Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. It is not appropriate to discharge these materials back to the stormwater drainage system. Part of arranging for maintenance to occur should include coordination of disposal of solids (landfill coordination) and liquids (municipal vacuum truck decant facility, local wastewater treatment plant, on-site treatment and discharge). Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals. Disposal methods or reuse of the media contained in the cartridges will be determined by Stormwater360. If the material has been contaminated with any unusual substance, the cost of special handling and disposal will be the responsibility of the owner.

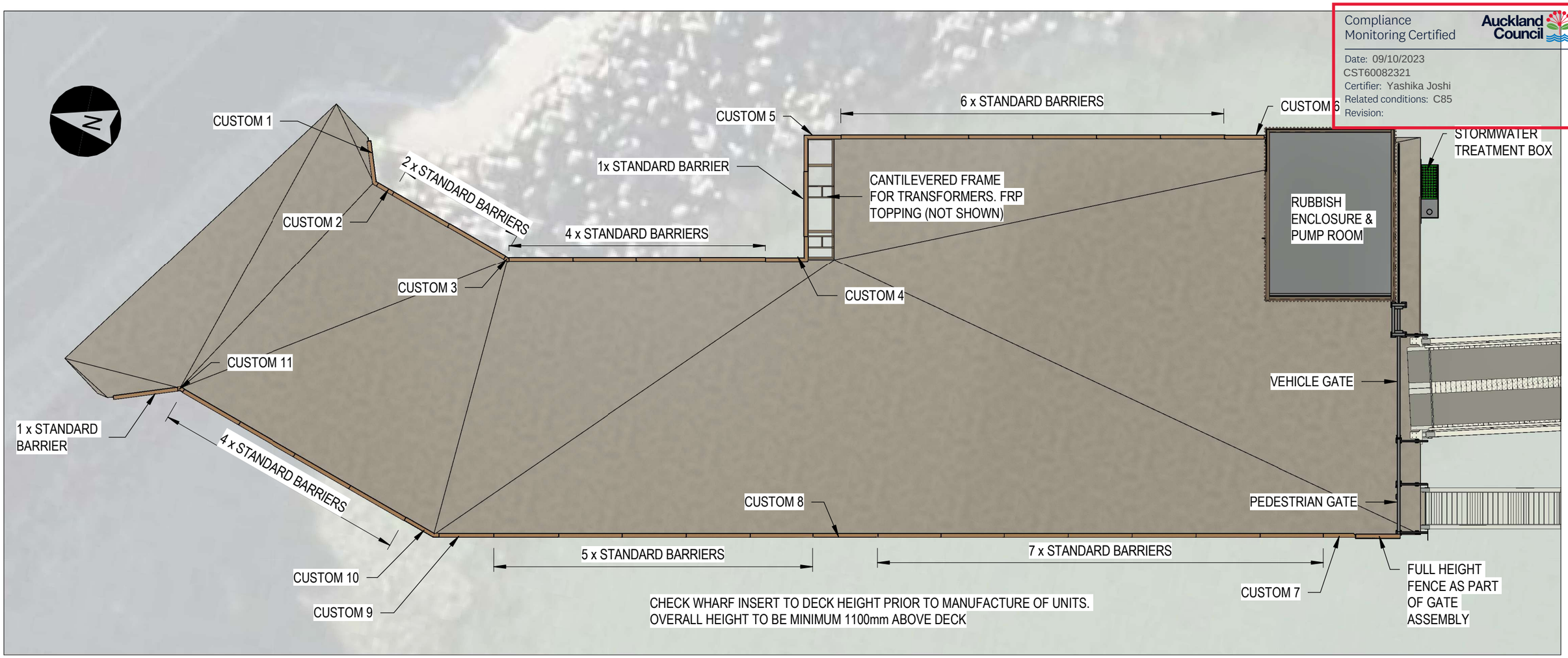
END OF SECTION D

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In addition to this O&M guideline, SW360 can supply the following resources upon request, where the asset/device owner does not have standard maintenance procedures/documents;

- Method Statements
  - MS-SF-0003; StormFilter Pre-Maintenance Inspection via Confined Space Entry
  - MS-SF-0006; StormFilter Cartridge Installation
  - StormFilter Inspection and Maintenance Procedures
- Confined Space Procedures
  - CSF 0029; Confined Space Entry Plan
- Product Drawings
- FAQs (Available from www.stormwater360.co.nz/faq)
- "How to" Videos (Available from www.youtube.com/user/stormwaterTV)

Further information and resources can be found on the SW360 website (http://www.stormwater360.co.nz/).



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APPROACH WHARF BARRIER PLAN (STANDARD & CUSTOM BARRIER LOCATIONS)

1 : 150

REFER TO LDP LIGHTING PLAN FOR DETAILS

NOTES:

- ALL BARRIER TYPES TO BE CONSTRUCTED WITH SIMILAR SPECIFICATIONS AS TYPICAL BARRIER (SHEET B-002, &, B-004)
- **MEASURE ON-SITE PRIOR TO FABRICATION**
- GAP BETWEEN WOODEN SLATS TO NOT EXCEED 100mm, IDEAL 93mm
- TRIM WOOD BACK AT LAP SECTION
- ALL BARRIERS TO BE MINIMUM 1100mm ABOVE DECK

Filename:

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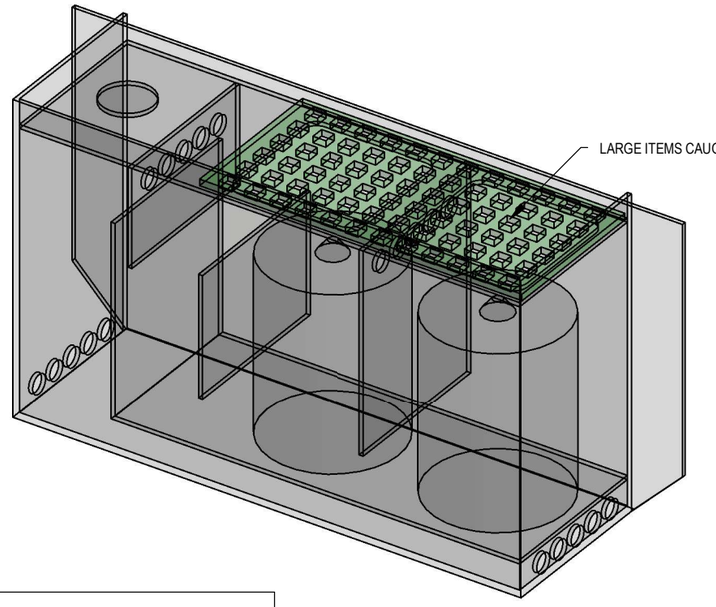
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1	RE-ISSUED FOR REVIEW	21/01/2022
2	RE-ISSUED FOR REVIEW	27/04/2022
3	ISSUED FOR CONSENT	03/11/2022

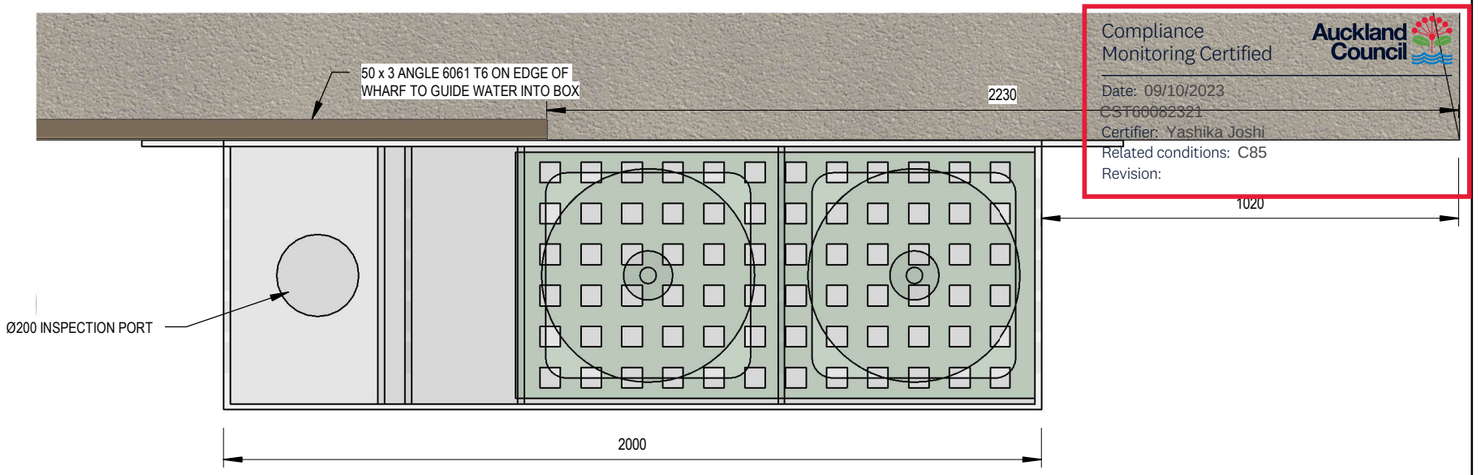
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SHEET DESCRIPTION: APPROACH WHARF BARRIER PLAN

STATUS: FOR CONSENT

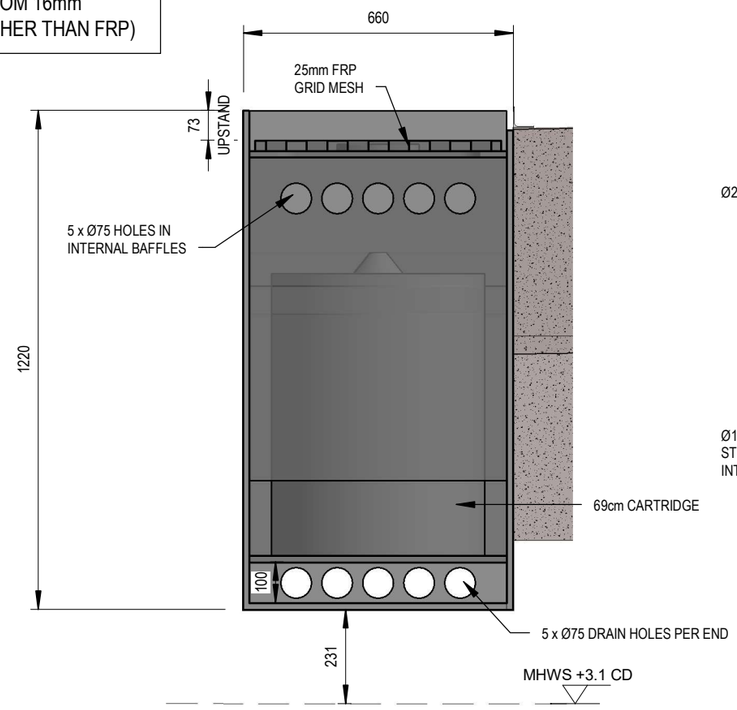
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19-1014	B-001	3





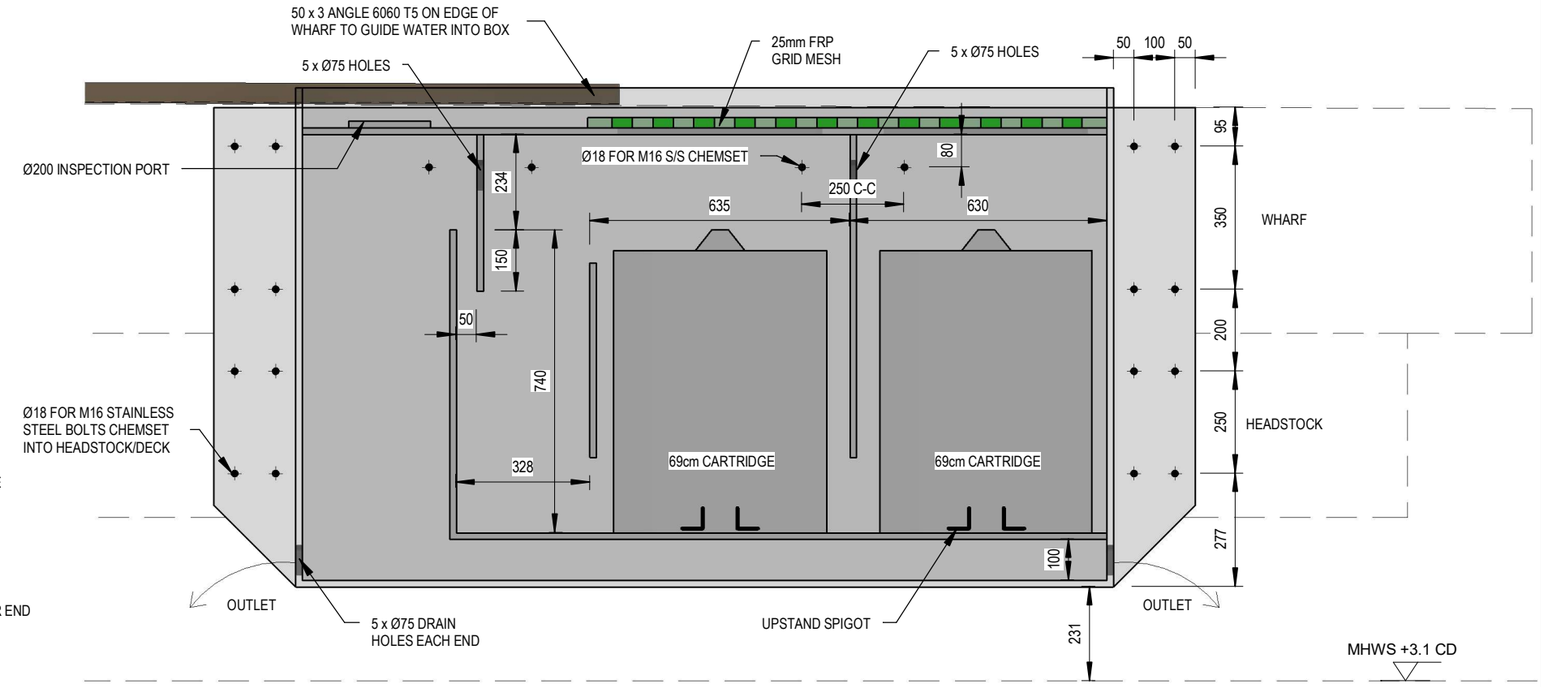
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Revision:

NOTES
- CONSTRUCTED FROM 16mm POLYTHYLENE (OTHER THAN FRP)



APPROACH WHARF STORMWATER BOX CROSS SECTION
1 : 15

APPROACH WHARF STORMWATER BOX PLAN
1 : 15



APPROACH WHARF STORMWATER BOX LONGITUDINAL SECTION
1 : 15

Filename:

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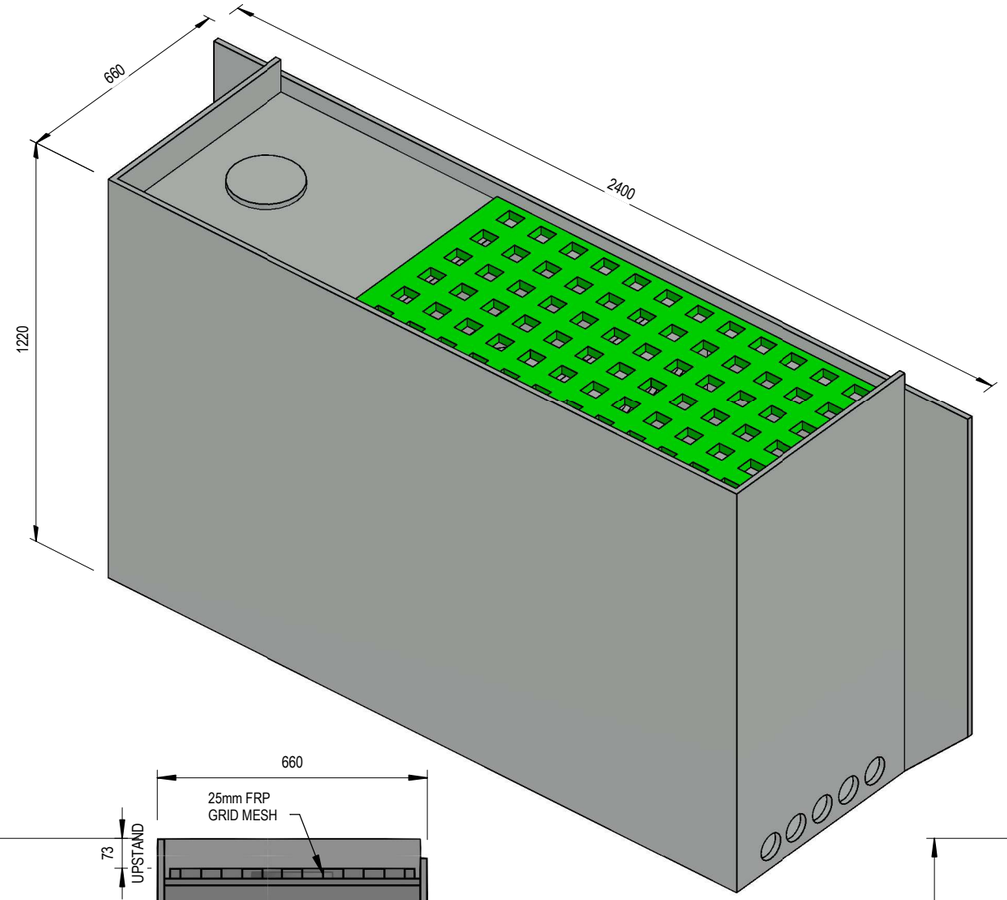
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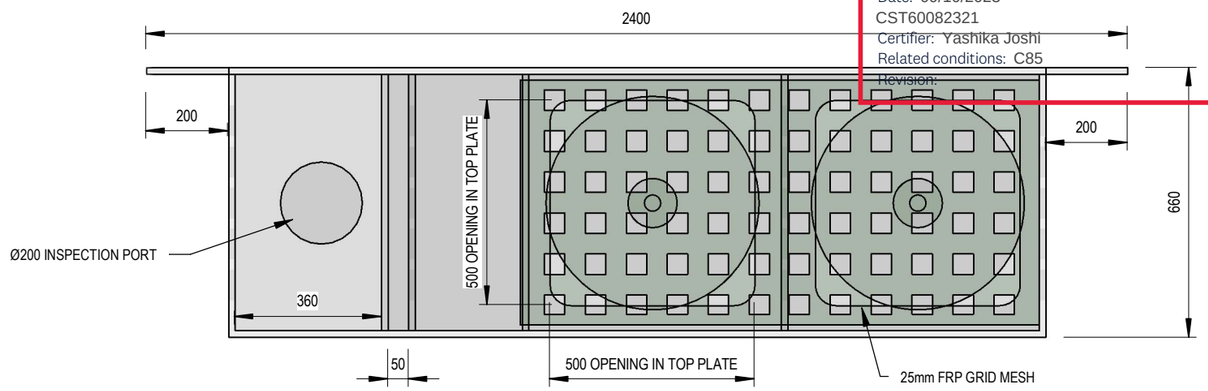
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STATUS: FOR CONSENT

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PROJECT NO.	**SHEET NO.**	**REV**
19-1014	D-009	0

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APPROACH WHARF STORMWATER BOX CONSTRUCTION PLAN
1 : 15

NOTES
- CONSTRUCTED FROM 16mm POLYTHYLENE (OTHER THAN FRP)

APPROACH WHARF STORMWATER BOX CONSTRUCTION CROSS SECTION
1 : 15

APPROACH WHARF STORMWATER BOX CONSTRUCTION LONGITUDINAL SECTION
1 : 15

Filename:

Plot Date: 3/11/2022 1:00:12 pm

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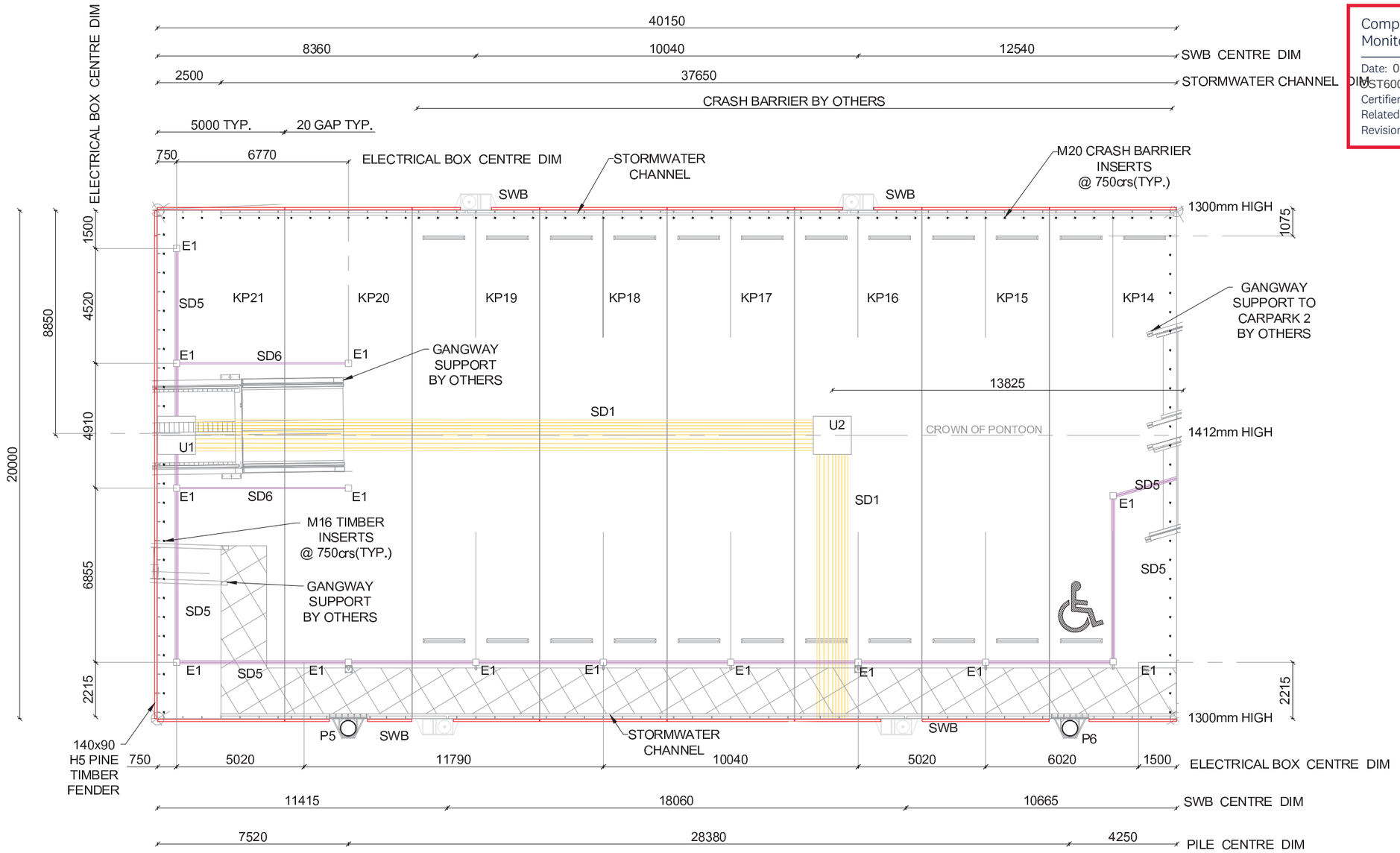
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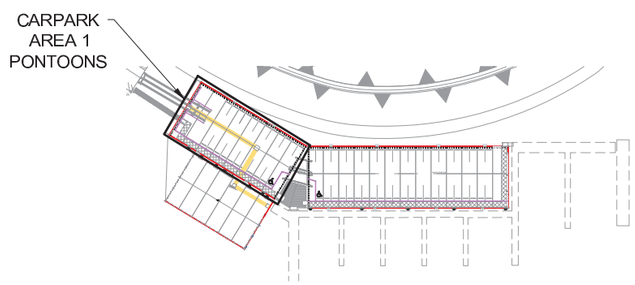
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APPROACH WHARF STORMFILTER BOX - CONSTRUCTION DETAILS

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FOR CONSENT		
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MW	RB	A3
PROJECT NO.	SHEET NO.	REV
19-1014	D-010	0



PLAN
1:180

Carpark Area 1 Pontoons	
KP14 = SF1250-20m x 5m	1
KP15 = SF1250-20m x 5m	1
KP16 = SF1250-20m x 5m	1
KP17 = SF1250-20m x 5m	1
KP18 = SF1250-20m x 5m	1
KP19 = SF1250-20m x 5m	1
KP20 = SF1250-20m x 5m	1
KP21 = SF1250-20m x 5m	1
KP22 = SF1250-20m x 5m	1
P - 610Ø PILES / PILE GUIDES / HALFEN TRACK (REFER TO NOTE 1)	2
U3 - UTILITIES BOX 1400 x 1200	1
U4 - UTILITIES BOX 1500 x 1200	1
SD1 - SERVICE DUCT - 3 x 150Ø & 6 x 100Ø	-
SWB - STORM WATER BOX	4
E1 - ELECTRICAL BOX	14
SD5 - ELECTRICAL & WATER DUCT - 2 x 50Ø	-
SD6 - ELECTRICAL DUCT - 1 x 50Ø	-



NOTE:

1. REFER TO DWG 0008-HER-05-01-G007 FOR PILING DETAILS

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Revision:

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PROJECT: KENNEDY POINT MARINA
UNIT: CARPARK AREA 1 PONTOONS
BLOCK: GENERAL ARRANGEMENT
DRAWING No: 0008-HER-05-01-G005

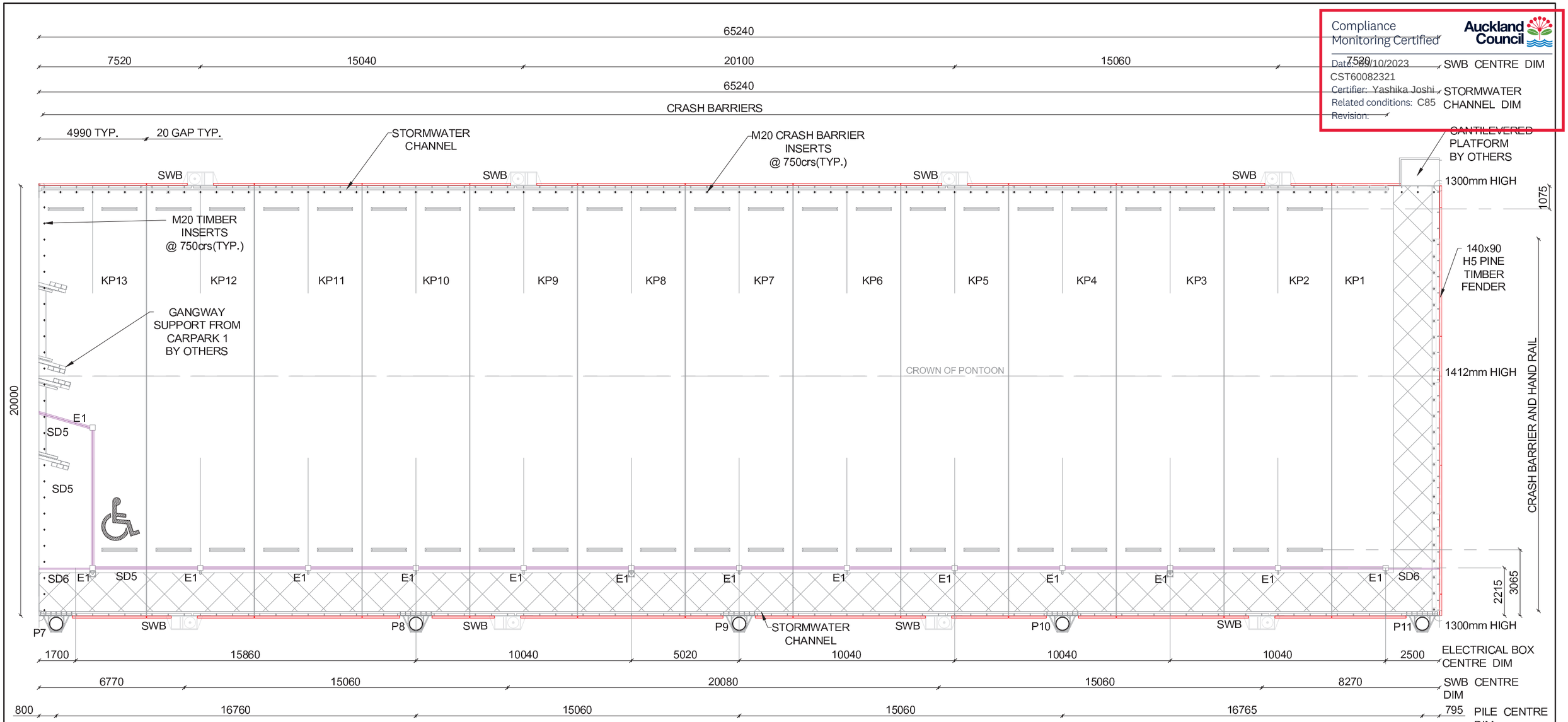
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2	29.04.21	CLIENT ISSUE	AL
1	14.04.21	FOR INFORMATION	AL
A	18.03.21	FOR DESIGN	AL

Design	–	–	
Drawn	AL	Apr 21	
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Approved For Construction	–	–	
	By	Date	

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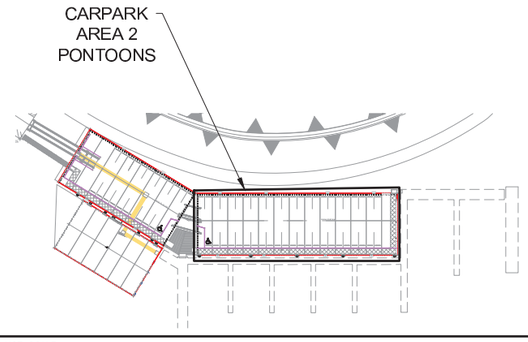
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Certifier: Yashika Joshi
Related conditions: C85
Revision:



PLAN
1:180

Carpark Area 2 Pontoons	
KP1 = SF1250-20m x 5m	1
KP2 = SF1250-20m x 5m	1
KP3 = SF1250-20m x 5m	1
KP4 = SF1250-20m x 5m	1
KP5 = SF1250-20m x 5m	1
KP6 = SF1250-20m x 5m	1
KP7 = SF1250-20m x 5m	1
KP8 = SF1250-20m x 5m	1
KP9 = SF1250-20m x 5m	1
KP10 = SF1250-20m x 5m	1
KP11 = SF1250-20m x 5m	1
KP12 = SF1250-20m x 5m	1
KP13 = SF1250-20m x 5m	1
P - 610 PILES / PILE GUARDS / HALFEN TRACK (REFER TO NOTE 1)	5
SWB - STORM WATER BOX	8
E1 - ELECTRICAL BOX	13
SD5 - ELECTRICAL & DUCT - 2 x 50Ø	-
SD6 - ELECTRICAL & DUCT - 1 x 50Ø	-



NOTE:

1. REFER TO DWG 0008-HER-05-01-G010 FOR PILING DETAILS

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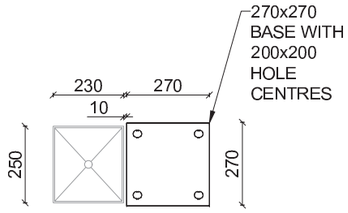
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PROJECT: KENNEDY POINT MARINA
UNIT: CARPARK AREA 2 PONTOONS
BLOCK: GENERAL ARRANGEMENT
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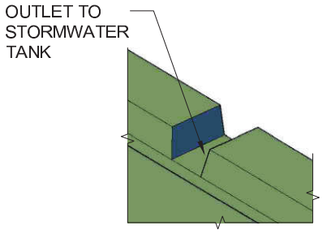
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A	18.03.21	FOR DESIGN	AL	Approved For Construction	–	–	

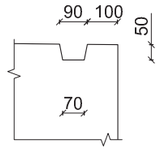
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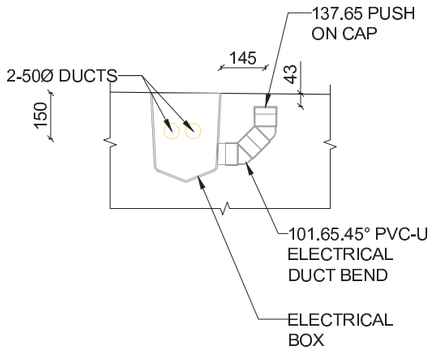


PLAN VIEW
1:20

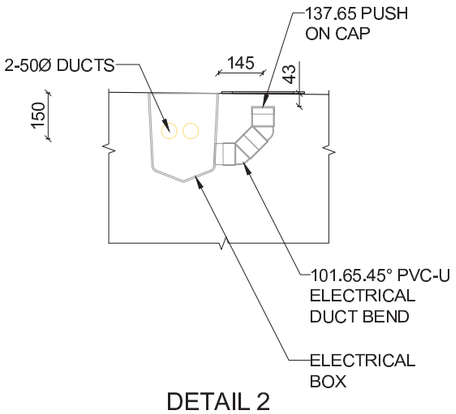




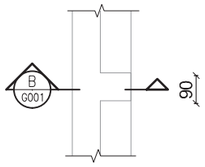
SECTION B-B
1:20



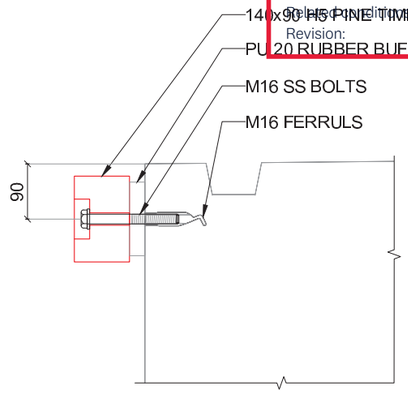
DETAIL 1
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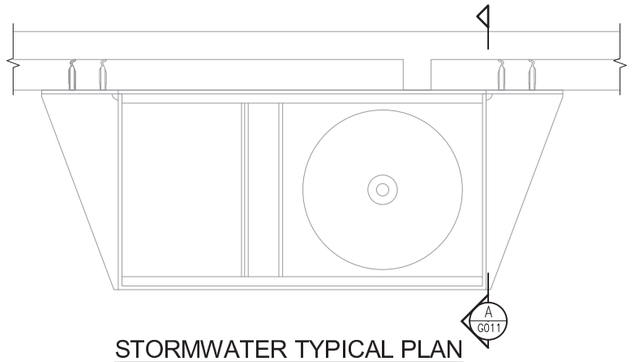
DETAIL 2
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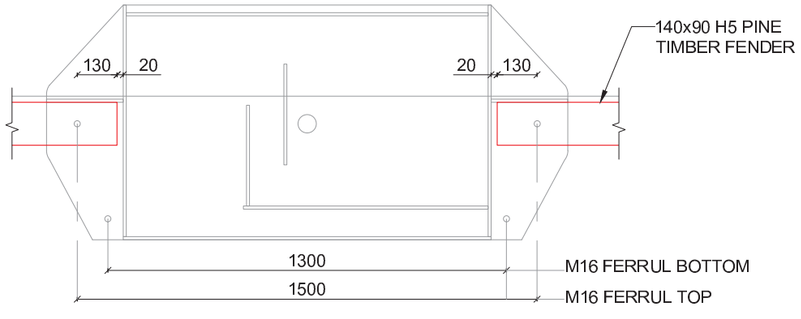
DETAIL 3
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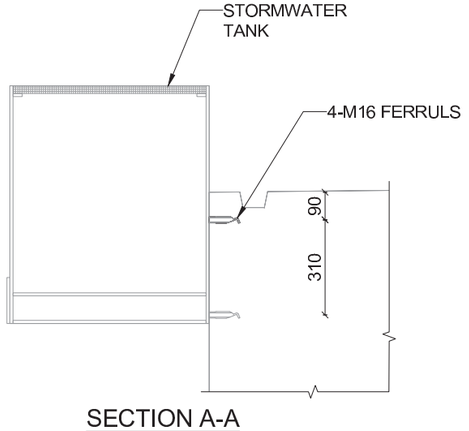
TIMBER FENDER TYPICAL DETAIL
1:20



STORMWATER TYPICAL PLAN
1:20



STORMWATER TYPICAL ELEVATION
1:20



SECTION A-A
1:20

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Compliance Monitoring Certified
Auckland Council
Date: 09/10/2023
CST60082321
Certifier: Yashika Joshi
Building Consent: CST60082321
Revision:

Heron Construction Co. Ltd.

PROJECT: KENNEDY POINT MARINA
UNIT:
BLOCK:
GENERAL DETAILS
TYPICAL GENERAL DETAILS
DRAWING No: 0008-HER-05-01-G011

No.	Date	Revision	By				
4	12.08.21	CLIENT ISSUE	AL	Design	–	–	
3	18.05.21	CLIENT ISSUE	AL	Drawn	AL	Apr 21	
2	29.04.21	CLIENT ISSUE	AL	Dsg Chk	–	–	
1	14.04.21	FOR INFORMATION	AL	Dwg Chk	TP	Apr 21	
A	18.03.21	FOR DESIGN	AL	Approved For Construction	–	–	

STATUS: 1
STAMP: CLIENT ISSUE

DATE PLOTTED:
BY:Daniel Owen
ORIGINAL SIZE A1 : DO NOT SCALE
IF IN DOUBT ASK
CAD FILE PATH: