



Bushfire Hazard Management Plan Report, Subdivision - 33 Elderslie Road, Brighton

Client: Burbury Consulting Pty Ltd
Date: June 2023 - Rev1

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Appendix A - Site Images

Appendix B – Bushfire Hazard Management Plan, certified date 12.06.2023; Bushfire Prone Areas Code Certificate & Certificate of Specialist or Other Person (Form 55) 2023.06 – 33 Elderslie

1. Introduction

The intent of this report is to analyse and confirm the suitability of the bushfire prone land to be successfully developed for subdivision in accordance with the Tasmania Planning Scheme – Brighton, Code C13.0 Bushfire-Prone Areas Code (the Code) and the Building Regulations.

The Bushfire Hazard assessment describes the site and surrounding area, classifying the vegetation, assessing the slopes and environmental features. This report should be included with approval documentation in support of the Bushfire Hazard Management Plan (BHMP) and accompanying Certifications. The Bushfire Hazard Management Plan in conjunction with this Report make up the certified documentation intended to satisfy the Code & Building Regulations.

The applicable section of the Planning Code is C13.6 Development Standards for Subdivision. The body of this report describes the site and assesses the requirements to be implemented to satisfy the Code.

2. Limitation of Report & Bushfire Hazard Management Plan

This report has been prepared for the abovementioned clients for their use and distribution only. The main intent of the report is to be used as supporting documentation for the Development Application and forms part of the subdivision Bushfire Hazard Management Plan. Should submitted Development Application Plans differ from the Plans in this reports Appendix then an amended design review should be conducted to determine the suitability of any amendments in relation to the Bushfire Prone Area Requirements of AS3959-2018 and the Planning Scheme. It is the responsibility of the regulatory authorities to determine consistency between the Bushfire Hazard Management Plan and the Development Plans.

It is also to be noted that the assessment has been conducted according to the site assessment being conducted in May 2023 and does not take into account the possibility of altered site conditions either naturally occurring or where currently maintained/excluded vegetation conditions change due to a lack of ongoing maintenance.

It should be noted that compliance with the recommendations contained in this assessment does not mean that there is no residual risk to life safety or property as a result of bushfire. A residual level of risk remains which recognizes that removing the risk to life and property in absolute terms is not achievable while people continue to build in bushfire prone areas. This limitation is expressed in the following extract from AS 3959 (2018) which states (in the forward),

It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behavior of fire, and extreme weather conditions.

This level of residual risk is inherent in all bushfire standards and also applies to this assessment.

3. Site Description and Proposal

The 33 Elderslie Road, Brighton Subdivision Development consists of one existing land parcel (CT: 178982/1) located in the municipality of the Brighton Council.

The development proposal is for a planning permit for subdivision pursuant to the Land Use Planning and Approvals Act at 33 Elderslie Road, Brighton – CT: 178982/1.

The property that forms the proposed Subdivision is an existing lot zoned General Residential.

The proposed subdivision (shown in Figure 1) seeks to create 107 subdivided lots, roads, reserves and Public Open Space. All lots will have direct vehicle access to existing/new municipal Road and a new municipal fire fighting water supply. This subdivision application is not anticipated to be staged.

3.1 Property Details

Address: 33 Elderslie Road, Brighton 7030

Municipality: Brighton Council

Zoned: General Residential (Southern Midlands Local Provisions Schedule)

Overlay: Bushfire Prone Areas

Proposed Zone: No Change - As above

Lot Number: 178982/1

Type of Development: Subdivision



Figure 1 - Subdivision Civil Works Plan

4. Classification of Vegetation

The existing lot is currently developed for residential use in accordance with its current zoning. The proposed subdivision will create 106 new residential lots, a business zone lot (Lot 109), roads and a remaining Public Open Space lot.

The property is currently partially cleared and maintained to a low threat level as well as some hazardous vegetation within and external to the property.

The vegetation affecting the development has been classified in accordance with Clause 2.2.3 of AS 3959-2018.

In Tasmania, in accordance with Clause 2.2.2 of AS 3959-2009, the relevant Fire Danger Index applied for Tasmania is 50 (FDI 50).

When considering the definition of Bushfire Prone Area under the Code we have determined the proposed building area location is land that is within the boundary of a bushfire-prone area shown on an overlay on a planning scheme map is therefore considered 'Bushfire Prone'.

From and within the proposed development site an assessment survey has been conducted to determine the vegetation types, their proximities and slopes under the vegetation. In this case the Grassland hazard to the South is of the highest hazard rating.

Figure 2, below indicates the Bushfire Prone Vegetation described.



Figure 2 – Indicative Grassland and Woodland Bushfire Prone Vegetation – subject site highlighted yellow and pinned – NTS

4.1 Slope

The Effective slope of the land under the classified vegetation is determined in accordance with Clause 2.2.5 of AS 3959-2018.

The *effective* slope under the bushfire prone vegetation within 100 metres of all building areas is Downslope $0-5^{\circ}$ to the East and all other azimuths are Upslope/ 0° .

In accordance with Clause 2.2 of AS 3959-2018, the Simplified Procedure has been applied to determine the Bushfire Attack Level (BAL) for the proposed development. In accordance with the Code, fire-fighting water supply and vehicle access are also considered and discussed in relation to the proposed development.

4.2 Subdivision Bushfire Attack Level

Considering the current conditions site and surrounding vegetation and topography conditions we have undertaken a Bushfire Attack Level Assessment in accordance with AS3959-2018. The development is capable of achieving the minimum standard required by the Code.

The highest BAL rating to be applied to any Bushfire Prone lot in this instance is BAL-19 – the building areas are located on the proposed lots so as to provide a hazard management area between the bushfire prone vegetation and

the building areas of a distance equal to or greater than the BAL-19 separation distances nominated by AS3959-2018; when vegetation types and slopes are considered in accordance with Section 2.2 of AS3959-2018.

The HMA between the hazardous vegetation and the building area is nominated on the Lot Detail Plan as "BAL-19 HMA Setback". Table 1 below is a general 360° Bushfire Attack Level Assessment undertaken to identify the bushfire prone vegetation types, determine the effective slopes under the bushfire prone vegetation and from these inputs the required clearance distances can be determined to achieve the minimum size of required BAL-19 HMA. The BAL Rating for each lot are nominated on the approved Bushfire Hazard Management Plan.

The Tasmania Fire Service have also provided the Southern Midlands Council with Bushfire Risk Advice via email following a site assessment. This advice has been confirmed and the BAL ratings and BHMP are consistent with this advice. Refer to **Appendix C** for an extract from the Tasmania Fire Service email advice.

Table 1 - Bushfire Attack Level Assessment Summary

Relevant fire danger index: (see clause 2.2.2)

FDI 50

Assess the vegetation within 100m in all directions (tick relevant group)

Note 1: Refer to Table 2.3 and Figures 2.3 & 2.4 for description and classification of vegetation.

Note 2: If there is no classified vegetation within 100 m of the site then the BAL is LOW for that part of the site.

Vegetation classification (see Table 2.3)	North <input checked="" type="checkbox"/> North-East <input checked="" type="checkbox"/>	South <input checked="" type="checkbox"/> South-West <input checked="" type="checkbox"/>	East <input checked="" type="checkbox"/> South-East <input type="checkbox"/>	West <input checked="" type="checkbox"/> North-West <input type="checkbox"/>
Group B - Woodland	-	Yes	-	YES
Group G - Grassland	-	YES	YES	YES

Exclusions (where applicable)	Highlight relevant paragraph descriptor from clause 2.2.3.2.			
	(b) (c) (d) (e) (f)	(b) (c) (d) (e) (f)	(b) (c) (d) (e) (f)	(b) (c) (d) (e) (f)

	North & North-East	South & South-West	East	West
Distance Required to achieve BAL-19	-	15m (lots 1-12)	11m (POS lot)	15m (lots 12-18) 10m (lots 19-34)
Effective slope	Upslope			
Slope under the classified vegetation	Upslope/0° <input checked="" type="checkbox"/>	Upslope/0° <input checked="" type="checkbox"/>	Upslope/0° <input type="checkbox"/>	Upslope/0° <input checked="" type="checkbox"/>
	Downslope			
	0-5° <input type="checkbox"/>	0-5° <input type="checkbox"/>	0-5° <input checked="" type="checkbox"/>	0-5° <input type="checkbox"/>
BAL value for each side of the site. Achievable BAL rating in (xx)	BAL-19	BAL-19	BAL-19	BAL-19

Determination of Bushfire Attack Level (BAL)

Achievable BAL for this development is:	BAL-19
Comments / Options / Limitations	<p>The BAL rating is based upon the condition of vegetation encountered at the time of inspection. The vegetation within the site and all created lots shall be maintained to a <i>Low Threat</i> Level (in accordance with AS3959-2018).</p> <p>North-East external to the site has been assessed Low Threat Vegetation due to the current development of the New Brighton High School - this accounts for the 180m setback from Elderslie Road for the commencement of the BAL-19 HMA Setback - this has an impact on the BAL Rating of lots within the proposed subdivision.</p> <p>North external to the has been assessed Low Threat Vegetation due to the General Residential Zone being developed and well maintained throughout.</p> <p>The HMA must provide a BAL-19 setback buffer - as dimensioned on the approved BHMP.</p> <p>Vegetation external to the site may be subject to change over time - this BAL rating does not account for any future change to the state of/hazard levels of vegetation within or external to the site.</p>

5. Subdivision C13.6.2 Public and fire fighting access

The primary access to the subdivided lots is to be a newly formed municipal roads, which are to be designed and constructed in accordance with the below table.

The access' serving each building area shall meet the intended requirements of the Code – not required as fire fighting vehicles will be connected to a fire fighting water supply on the new roads.

It is recommended that Council condition all permits for the future lot level developments must include property access in accordance with Table C13.2 of the Code – where required to enter the property to connect to a fire fighting water point.

New roads link to existing sealed roads which facilitate vehicle turning and through roads. The road design has provision for through road access and also facilitates turning at a termination for future developments.

The subdivision access roads serving Bushfire-Prone lots are to be designed and constructed in accordance with Compliance Standard for Property Access of each lot shall be in accordance with the requirements set out in Table C13.1 – the requirements to be met are as follows:

Table C13.1: Standards for Roads		
Element		Requirement
A.	Roads	<p>Unless the development standards in the zone require a higher standard, the following apply:</p> <ul style="list-style-type: none"> (a) two-wheel drive, all-weather construction; (b) load capacity of at least 20t, including for bridges and culverts; (c) minimum carriageway width is 7m for a through road, or 5.5m for a dead-end or cul-de-sac road; (d) minimum vertical clearance of 4m; (e) minimum horizontal clearance of 2m from the edge of the carriageway; (f) cross falls of less than 3 degrees (1:20 or 5%); (g) maximum gradient of 15 degrees (1:3.5 or 28%) for sealed roads, and 10 degrees (1:5.5 or 18%) for unsealed roads; (h) curves have a minimum inner radius of 10m; (i) dead-end or cul-de-sac roads are not more than 200m in length unless the carriageway is 7 metres in width; (j) dead-end or cul-de-sac roads have a turning circle with a minimum 12m outer radius; and (k) carriageways less than 7m wide have 'No Parking' zones on one side, indicated by a road sign that complies with Australian Standard AS1743-2001 Road signs-Specifications.
Table C13.2 Standards for Property Access		
A.	Property access length is less than 30m; or access is not required for a fire appliance to access a fire fighting water point.	<p>There are no specified design and construction requirements.</p> <p>If a fire fighting vehicles needs to enter the property to connect to the fire fighting water point the property access must comply with section B. below.</p> <p>It is recommended that the fire fighting water point be located so that fire fighting vehicles do not have to enter the property, however fire fighting vehicle hardstands must be within 3 metres of the fire fighting water point.</p>
B.	Property access length is 30m or greater; or access is required for a fire appliance to a fire fighting water point.	<p>The following design and construction requirements apply to property access:</p> <ul style="list-style-type: none"> a) all-weather construction; b) load capacity of at least 20t, including for bridges and culverts; c) minimum carriageway width of 4m; d) minimum vertical clearance of 4m; e) minimum horizontal clearance of 0.5m from the edge of the carriageway; f) cross falls of less than 3 degrees (1:20 or 5%); g) dips less than 7 degrees (1:8 or 12.5%) entry and exit angle; h) curves with a minimum inner radius of 10m; i) maximum gradient of 15 degrees (1:3.5 or 28%) for sealed roads, and 10 degrees (1:5.5 or 18%) for unsealed roads; and

		<p>j) terminate with a turning area for fire appliances provided by one of the following:</p> <ul style="list-style-type: none"> i. a turning circle with a minimum outer radius of 10m; or ii. a property access encircling the building; or <p>a hammerhead "T" or "Y" turning head 4m wide and 8m long.</p>
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6. Subdivision C13.6.3 Provision of water supply for fire fighting purposes

The Subdivision is to be served by a water corporation reticulated hydrant system.

The reticulated hydrant system serving each building area shall meet the intended requirements of the Code.

Ensure that future multi residential and commercial developments are provided with fire fighting water supplies in accordance with Table C13.4 of the Code.

The development is not intended to be staged and all lots will be served by a compliant reticulated hydrant system prior to the sealing of titles.

The subdivision reticulated hydrant system serving Bushfire-Prone lots are to be designed and constructed in accordance with Compliance Standard for *Reticulated water supply for fire fighting* in accordance with the requirements set out in Planning Code C13.6.3 Table C13.4 – the requirements to be met are as follows:

Table C13.4: Reticulated water supply for fire fighting		
Element		Requirement
A.	Distance between building area to be protected and water supply.	<p>The following requirements apply:</p> <ul style="list-style-type: none"> (a) the building area to be protected must be located within 120m of a fire hydrant; and (b) the distance must be measured as a hose lay, between the fire fighting water point and the furthest part of the building area.
B.	Design criteria for fire hydrants	<p>The following requirements apply:</p> <ul style="list-style-type: none"> (a) fire hydrant system must be designed and constructed in accordance with TasWater Supplement to Water Supply Code of Australia WSA 03 – 2011-3.1 MRWA 2nd Edition; and (b) fire hydrants are not installed in parking areas.
C.	Hardstand	<p>A hardstand area for fire appliances must be:</p> <ul style="list-style-type: none"> (a) no more than 3m from the hydrant, measured as a hose lay; (b) no closer than 6m from the building area to be protected; (c) a minimum width of 3m constructed to the same standard as the carriageway; and (d) connected to the property access by a carriageway equivalent to the standard of the property access

7. Hazard Management Areas C13.6.1

As part of the subdivision development it is required that vegetation hazards within all lots and the Hazard Management Area (HMA) will be cleared so that they can be classified as Low Threat Vegetation in accordance with AS3959-2018.

Hazardous vegetation impacting upon the development as discussed above comprises Woodland and Grassland indicated in Figure 2 above. It is expected the subdivision development will require modification of vegetation within the subdivided lots, ongoing hazard management for the benefit of the subdivided lots building areas is required.

The entirety of the lots (lots 1 to 107 & POS) is to be established and maintained Low Threat vegetation in accordance with AS3959-2018. For perpetuity, all areas of privately owned land and POS are nominated on the BHMP as Hazard Management Areas are to be continually managed to a low threat level - as per Clause 2.2.3.2 of AS3959-2018. These areas are nominated on the Bushfire Hazard Management Plan as the Hazard Management Area (HMA) – being the red shaded area, red shaded cross hatch areas.

Proposed Roadways and Public Open Space areas are assumed to become the responsibility of the Council for future ongoing maintenance and are also to be considered Low Threat vegetation in accordance with AS3959-2018.

The Certified Bushfire Hazard Management Plan indicates the BAL Ratings, which apply across all residential lots in the development.

The HMA refers to land that is managed in a minimum fuel condition to reduce the potential exposure of habitable buildings and occupants to radiant heat and flames and to provide defensible space. The effectiveness of the hazard management areas is reliant on ongoing maintenance by landowners. HMA's need to be implemented prior to sealing titles and it is recommended that a suitable instrument, such as an easement or restrictive covenant that requires - land owners to not allow for fuel to accumulate and create a fire hazard - be placed on each title. The main purpose of this being each lot will be relying on the maintenance of the adjoining lot to achieve required separation distances in order to achieve the specified BAL rating. The developer will be responsible for the management of vegetation on each lot until such time as the lots are sold. The developer is also responsible for maintaining unsold lots and the undeveloped balance of each stage and that management involves maintain the vegetation as low threat as described in AS3959 part 2.2.3.2.

The minimum extents of the HMA are demonstrated on the BHMP. As the proposed HMAs rely upon one another for mutual protection, they must be established prior to the sealing of titles and maintained in perpetuity by the respective owners. Management prescriptions for the proposed HMA are provided in Table 2.

Table 2 - Bushfire Hazard Management Plan - Vegetation Management Requirement

Zone Name	Ongoing Maintenance Requirements
Within approved lots and nominated Hazard Management Area (HMA)	<p>Vegetation is to be continually managed to a low threat in accordance with AS3959-2018. In this case low threat vegetation can be a combination of :</p> <ul style="list-style-type: none"> • Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops; and • Low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns and cultivated gardens. <p>NOTE: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).</p>

	Maintenance shall include (but is not limited to): <ul style="list-style-type: none">• Removal of fallen limbs, leaf and bark litter;• Cut grasses short (less than 100mm) and maintain;• Remove vegetation debris;• Complete under-brushing and thin out the under storey;• Cut tree limbs within 2 metres of the ground;• Maintain horizontal and vertical canopy separation;• Prevent encroachment of Bushfire Prone Vegetation into the HMA.
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NOTE: All lots within the subdivision (excluding the balance lot) is to be maintained to a Low Threat Level for ongoing hazard management for the benefit of all the newly created lots.

The proposal complies with A1(b)(i) of C13.6.1 Subdivision: Provision of hazard management areas - of the planning scheme as the attached proposed plan of subdivision includes all of the lots that are proposed within a bushfire prone area as well as those that are not.

The proposal complies with A1(b)(ii) and (iii) as the plan of subdivision shows building areas for each lot and hazard management areas between the building areas and bushfire prone vegetation greater than the separation distances required for BAL-19 in AS3959:2018.

A1(b)(iv) is also met as the attached BHMP also shows hazard management areas between the building areas and bushfire prone vegetation equal to or greater than the separation distances required for BAL-19 in AS3959:2018 and is certified by an accredited person.

Upon commencement of constructed the development shall be cleared and maintained to a low threat state.

8. Conclusion

The Bushfire Hazard Management Plan demonstrates BAL-19 (the minimum requirement for subdivision) compliant nominated clearances and specifies the maintenance of this zone in accordance with the HMA, low threat vegetation requirements of AS 3959-2018. This demonstrates sufficient access to the building area possible to protect both fire fighters and occupants exposed to bushfire when defending the property.

The plan demonstrates suitable access and egress options for property occupants and emergency services. A reticulated firefighting water supply must be provided which allows for fire-fighting access to the most disadvantaged part of all lots building areas.

The proposed Bushfire Hazard Management Plan, accompanied by this report and its compliance standards as supporting documentation, along with the Certification of referenced documents demonstrates likely compliance with the applicable Sections of the Code.

9. Recommendations

It is recommended the following be included as conditions of the Regulatory Approval documentation.

- HMA's are to be implemented prior to sealing titles and it is recommended that a suitable instrument, such as an easement or restrictive covenant, that requires landowners to not allow for fuel to accumulate and create a fire hazard be placed on each title. The purpose of this covenant being that each lot will be relying on the

maintenance of the adjoining lot to achieve required separation distances to achieve the specified BAL ratings.

10. References

Tasmanian Planning Scheme – Brighton – Part C13.0 Bushfire-Prone Areas Code

LIST map version. Aerial Photograph [online]. Available from: <<http://www.thelist.tas.gov.au/listmap/listmap>>

Standards Australia 2018, *Construction of buildings in bushfire prone areas*, AS 3959-2018.

Appendix A – Site Images

Location Plan – subject site highlighted yellow and pinned – Not to Scale











Appendix B – Bushfire Hazard Management Plan, certified date 12.06.2023; Bushfire Prone Areas Code Certificate & Certificate of Specialist or Other Person (Form 55) 2023.06 – 33 Elderslie

- NOTES**
- THIS PLAN HAS BEEN PREPARED AS A PRELIMINARY DEVELOPMENT INTENT LAYOUT PLAN TO COUNCIL AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
 - LOT SIZE AND LAYOUT SUBJECT TO FINAL LAYOUT AND INFRASTRUCTURE ASSESSMENT/INVESTIGATION.
 - LOT LAYOUT SUBJECT TO PLANNING ADVICE AND APPROVAL.
 - THIS PLAN IS ONLY TO BE USED FOR DISCUSSION PURPOSES WITH COUNCIL AND LAYOUT SUBJECT TO APPROVAL OF COUNCIL AND TASWATER.

ENSURE THAT DETAILED DESIGN DOCUMENTATION PROVIDES FOR:
 PUBLIC AND FIRE FIGHTING ACCESS IN ACCORDANCE WITH C13.6.2 OF THE TASMANNIAN PLANNING SCHEME INCLUDING TABLES C13.1 & C13.2.
 AND PROVISION OF WATER SUPPLY FOR FIRE FIGHTING PURPOSES IS IN ACCORDANCE WITH C13.4 OF THE TASMANNIAN PLANNING SCHEME INCLUDING TABLE C13.4.

This plan demonstrates compliance with Bushfire Prone Areas Code C13.0 of the Tasmanian Planning Scheme;
 The Hazard Management Areas (HMA) indicated on this plan must be established and maintained as per the plan and nominated setback distances. All lots throughout the subdivision comprise the Hazard Management Areas (HMA) & must be maintained to a Low Threat Level in accordance with AS3959-2018.

Public and fire fighting access arrangements must comply with Table C13.1.1 & Table C13.2.2 of the Tasmanian Planning Scheme.

Fire fighting water supply complies with AS3959 and Code C13.6.3 Table C13.4 of the Tasmanian Planning Scheme.

For design and compliance specifications refer to sections 5 to 7 of the Bushfire Hazard Management Plan Report, Subdivision - 33 Elderslie Road, Brighton for Burbury Consulting Pty Ltd dated June 2023.

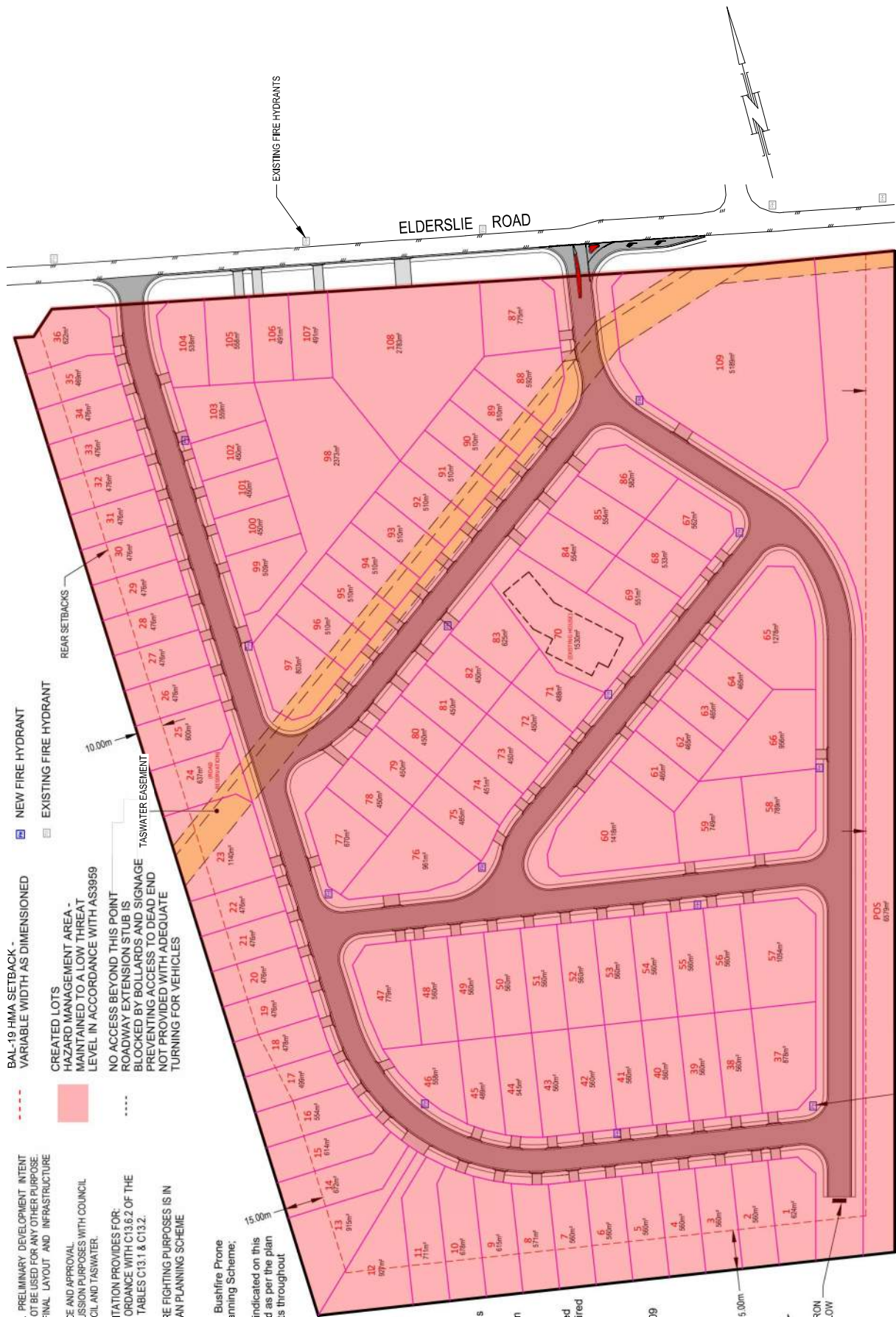
The Subdivision HMA is to be established as early as possible to provide the required HMA buffer for all proposed lots.

BAL Rating Schedule:
 BAL-19 - Lots 1 to 36.
 BAL-12.5 - 37 to 58, 66, 76 & 77.
 BAL-LOW - Lots 59 - 64, 67 - 75, 78 - 109

Certified By: Rhys Menadue -
 BFP-106
 Certificate No: 2023.06 - 33 Elderslie
 Date: 12.06.2023

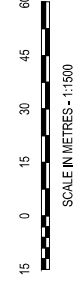
ROAD CLOSED SIGN AND CHEVRON AS PER EXAMPLE BELOW

ROAD CLOSED SIGN



PROPOSED FIRE HYDRANTS, SUBJECT TO FINAL ENGINEERING DESIGN

BHMP LAYOUT
 SCALE 1:1500



Rev No	Revision note	Date	Checked	Approved
A	ISSUED FOR APPROVAL	08/06/23	MM	MM



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Drawn By	Checked By	Date
MM	MM	08/06/23

Client	Project	Title	Scale
HOMES TASMANIA	ELDELSLIE ROAD SUBDIVISION	BUSHFIRE HAZARD MANAGEMENT PLAN	1:1500

PRELIMINARY - NOT FOR CONSTRUCTION

BUSHFIRE-PRONE AREAS CODE

CERTIFICATE¹ UNDER S51(2)(d) *LAND USE PLANNING AND APPROVALS ACT 1993*

1. Land to which certificate applies

The subject site includes property that is proposed for use and development and includes all properties upon which works are proposed for bushfire protection purposes.

Street address:

33 Elderslie Road, Brighton 7030

Certificate of Title / PID:

CT: 178982/1

2. Proposed Use or Development

Description of proposed Use and Development:

Subdivision

Applicable Planning Scheme:

Tasmanian Planning Scheme - Brighton

3. Documents relied upon

This certificate relates to the following documents:

Title	Author	Date	Version
Bushfire Hazard Management Plan and Specification, Subdivision – 33 Elderslie Road, Brighton	Rhys Menadue	Certified Date: June 2023	1
Bushfire Hazard Management Plan Report, Subdivision – 33 Elderslie Road, Brighton and all Appendices	Rhys Menadue	June 2023	1

¹ This document is the approved form of certification for this purpose and must not be altered from its original form.

4. Nature of Certificate

The following requirements are applicable to the proposed use and development:

<input type="checkbox"/> E1.4 / C13.4 – Use or development exempt from this Code	
Compliance test	Compliance Requirement
<input type="checkbox"/> E1.4(a) / C13.4.1(a)	Insufficient increase in risk

<input type="checkbox"/> E1.5.1 / C13.5.1 – Vulnerable Uses	
Acceptable Solution	Compliance Requirement
<input type="checkbox"/> E1.5.1 P1 / C13.5.1 P1	<i>Planning authority discretion required. A proposal cannot be certified as compliant with P1.</i>
<input type="checkbox"/> E1.5.1 A2 / C13.5.1 A2	Emergency management strategy
<input type="checkbox"/> E1.5.1 A3 / C13.5.1 A2	Bushfire hazard management plan

<input type="checkbox"/> E1.5.2 / C13.5.2 – Hazardous Uses	
Acceptable Solution	Compliance Requirement
<input type="checkbox"/> E1.5.2 P1 / C13.5.2 P1	<i>Planning authority discretion required. A proposal cannot be certified as compliant with P1.</i>
<input type="checkbox"/> E1.5.2 A2 / C13.5.2 A2	Emergency management strategy
<input type="checkbox"/> E1.5.2 A3 / C13.5.2 A3	Bushfire hazard management plan

<input checked="" type="checkbox"/> E1.6.1 / C13.6.1 Subdivision: Provision of hazard management areas	
Acceptable Solution	Compliance Requirement
<input type="checkbox"/> E1.6.1 P1 / C13.6.1 P1	<i>Planning authority discretion required. A proposal cannot be certified as compliant with P1.</i>
<input type="checkbox"/> E1.6.1 A1 (a) / C13.6.1 A1(a)	Insufficient increase in risk
<input checked="" type="checkbox"/> E1.6.1 A1 (b) / C13.6.1 A1(b)	Provides BAL-19 for all lots (including any lot designated as 'balance')
<input type="checkbox"/> E1.6.1 A1(c) / C13.6.1 A1(c)	Consent for Part 5 Agreement

<input checked="" type="checkbox"/>	E1.6.2 / C13.6.2 Subdivision: Public and fire fighting access	
	Acceptable Solution	Compliance Requirement
<input type="checkbox"/>	E1.6.2 P1 / C13.6.2 P1	<i>Planning authority discretion required. A proposal cannot be certified as compliant with P1.</i>
<input type="checkbox"/>	E1.6.2 A1 (a) / C13.6.2 A1 (a)	Insufficient increase in risk
<input checked="" type="checkbox"/>	E1.6.2 A1 (b) / C13.6.2 A1 (b)	Access complies with relevant Tables

<input checked="" type="checkbox"/>	E1.6.3 / C13.1.6.3 Subdivision: Provision of water supply for fire fighting purposes	
	Acceptable Solution	Compliance Requirement
<input type="checkbox"/>	E1.6.3 A1 (a) / C13.6.3 A1 (a)	Insufficient increase in risk
<input checked="" type="checkbox"/>	E1.6.3 A1 (b) / C13.6.3 A1 (b)	Reticulated water supply complies with relevant Table
<input checked="" type="checkbox"/>	E1.6.3 A1 (c) / C13.6.3 A1 (c)	Water supply consistent with the objective
<input type="checkbox"/>	E1.6.3 A2 (a) / C13.6.3 A2 (a)	Insufficient increase in risk
<input type="checkbox"/>	E1.6.3 A2 (b) / C13.6.3 A2 (b)	Static water supply complies with relevant Table
<input type="checkbox"/>	E1.6.3 A2 (c) / C13.6.3 A2 (c)	Static water supply consistent with the objective

5. Bushfire Hazard Practitioner

Name:

Rhys Menadue

Phone No:

0407 595 317

Postal
Address:

14 Reynolds Court
Dynnyrne TAS 7005

Email
Address:

rhmenadue@gmail.com

Accreditation No:

BFP – 106

Scope:

1, 2, 3a, 3b, 3c

6. Certification

I certify that in accordance with the authority given under Part 4A of the *Fire Service Act 1979* that the proposed use and development:

- Is exempt from the requirement Bushfire-Prone Areas Code because, having regard to the objective of all applicable standards in the Code, there is considered to be an insufficient increase in risk to the use or development from bushfire to warrant any specific bushfire protection measures, or
- The Bushfire Hazard Management Plan/s identified in Section 3 of this certificate is/are in accordance with the Chief Officer's requirements and compliant with the relevant **Acceptable Solutions** identified in Section 4 of this Certificate.

Signed:
certifier



Name:

Rhys Menadue

Date:

June 2023

Certificate
Number:

2023.06 – 33 Elderslie

(for Practitioner Use only)

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

To: *Owner /Agent*

 Address
 Suburb/postcode

Form **55**

Qualified person details:

Qualified person:
Address:

Licence No: Email address:
Phone No:
Fax No:
Qualifications and Insurance details: *(description from Column 3 of the Director of Building Control's Determination)*
Speciality area of expertise: *(description from Column 4 of the Director of Building Control's Determination)*

Details of work:

Address:

Lot No:
Certificate of title No:
The assessable item related to this certificate: *(description of the assessable item being certified)*
Assessable item includes –

- a material;
- a design
- a form of construction
- a document
- testing of a component, building system or plumbing system
- an inspection, or assessment, performed

Certificate details:

Certificate type: *(description from Column 1 of Schedule 1 of the Director of Building Control's Determination)*

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*

building work, plumbing work or plumbing installation or demolition work:

or

a building, temporary structure or plumbing installation:

In issuing this certificate the following matters are relevant –

Documents:

Relevant calculations:

- In Accordance with AS3959-2018; and
- the Building Regulations (TAS).

References:

- AS3959-2018;
- the Building Regulations (TAS); and
- Building Code of Australia (BCA).

Substance of Certificate: (what it is that is being certified)

BAL Ratings

Scope and/or Limitations

The assessment has been conducted according to information provided by the designer/client and freely available historical data and does not take into account the possibility of altered site conditions from the data relied upon.

It should be noted compliance with the recommendations contained in the certified documents does not mean that there is no residual risk to life safety and property as a result of bushfire. The limitation is expressed in the following extract from AS3959-2018, which states:

It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions.

The level of residual risk is inherent in all bushfire standards and also applies to this certification.


The assessment has been undertaken and certification provided on the understanding that; -

1. The certificate only deals with the potential bushfire risk all other statutory assessments are outside the scope of this report.
2. The report only identifies the size, volume and status of vegetation at the time the site inspection was undertaken and cannot be relied upon for any future development.

Impacts of future development and vegetation growth have not been considered.

I certify the matters described in this certificate.

Qualified person:

Signed: 

Certificate No:

2023.06 – 33
Elderslie

Date:

12.06.2023

To:	Leigh Wighton – Brighton Council		
Project:	Elderslie Road subdivision		
From:	Morgan McGuire	Date:	05/03/2024
Subject:	Stormwater Treatment	Job No.	1847

Referring to the RFI received from Council dated 15th February 2024 in relation to the current treatment train proposed we provide the following comments.

5. It is generally preferred to limit the variety of Stormwater Quality Improvement Devices (SQID) that are handed over to Council. As each different SQID has its own maintenance requirements, keeping the range of systems low will reduce the ongoing maintenance burden for Council's works crew.

Stormwater treatment innovation by proprietary devices is an ongoing improvement and management towards our environment. Whilst there are a number of Enviropods, they take between 5-10 minutes to empty compared to a large scale CDS style GPT.

6. For SQIDs that are to be handed over to Council, continuous deflection separation devices (e.g. CDS, Vortceptor, OceanSave) are typically preferred due to performance and ease of maintenance. That said, these systems do fill a slightly different role to the UpFlo units suggested

The Up Flo Filter is an all-in-one stormwater treatment system that is specifically designed to capture GP, TSS, TP and TN. If Council wants to have a CDS style GPT then this can be achieved however this is not necessary with the treatment train that has been proposed i.e. EnviroPod™, Up Flo Filter™ and Hydro BioFilter™. If Council requires a single GPT upstream of the UFF then it is important to understand the reasons why and what storage volume is acceptable in conjunction with Council maintenance regimes. i.e. Pollutant export vs storage volume vs maintenance intervals/yr.

The UFF filter media can not be blocked unless there is lack of monitoring and maintenance. Maintenance should be based upon the UFF operations and maintenance manual (see attached).

7. While there would be aesthetic value in the Biofilter systems, it may be a better long-term outcome to exclude these systems and to upgrade the UpFlo (or similar) units as necessary, as this would reduce the number of filtration-based units requiring maintenance from 11 to 2. This would also reduce the complexity of installation, as Biofilter systems must be carefully installed in relation to the adjacent road. Similarly, replacing the eight EnviroPod units with two CDS-style units immediately upstream of the proposed UpFlo would bring the total devices requiring ongoing maintenance from 19 to 4

Council should consider the time it takes to maintain such devices. The Enviropod units will take between 5-10 minutes to empty the contents. Cleaning a CDS style GPT will take 1-2 days for each system. Biofilter systems also have the benefit of the achieving landscaping elements that have been requested.

Please refer to letter from General Manager – Emerging Markets of Hydro International confirming the products

As it is proven that a stormwater treatment train can be achieved for the relevant pollutant target reductions, we suggest that any further requests and discussions with Council can be conditioned in a Development Use Permit and undertaken during detailed design with more collaboration with Council.

Yours faithfully,



Morgan McGuire

Team Leader – Civil Design

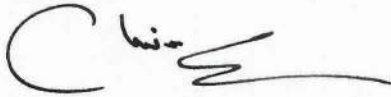
19 February 2024

To Whom It May Concern

Hydro International Ltd hereby confirm that the Hydro StormScape® and Hydro Biofilter™ products are available to be sold in the Australian market and that Stormwater Environmental Solutions Pty Ltd. has our permission to promote and supply products to customers within Australia.

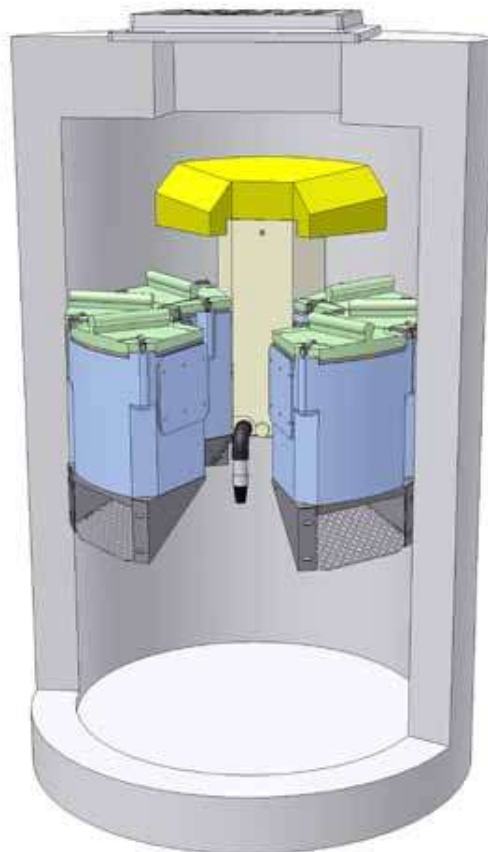
Should you require any further information please do not hesitate to contact me.

Yours faithfully,



Clive Evans
Managing Director – Emerging Markets





Operation and Maintenance Manual

Up-Flo[®] Filter

Filtration System for Stormwater Treatment

Stormwater Solutions
Turning Water Around ...[®]

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IMPORTANT - ORDER REPLACEMENT PARTS FOR MAINTENANCE - IMPORTANT

Annual maintenance requires replacement of the Media Packs and the Drain Down Filter. Contact Hydro International to order replacements. Allow 2-4 weeks for delivery.

Office hours Monday thru Friday 8:00 A.M. to 5:00 P.M. EST
 Toll free: 1-800-848-2706
 Phone: 207-756-6200
 Fax: 207-756-6212
 Email: stormwaterinquiry@hydro-int.com

COPYRIGHT STATEMENT: The contents of this manual, including the drawings and specifications contained herein or annexed hereto, are intended for the use of the recipient to whom the document and all associated information are directed. Hydro International plc owns the copyright of this document (including any drawings or graphics), which is supplied in confidence. It must not be used for any purpose other than that for which it is supplied and must not be reproduced, in whole or in part, stored in a retrieval system or transmitted in any form or by any means without prior permission in writing from Hydro International plc. Up-Flo® Filter is a trademarked filtration device of Hydro International plc. A patent covering the Up-Flo® Filter has been granted.

DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's Up-Flo® Filter. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc have a policy of continuous product development and reserve the right to amend specifications without notice.



Product Overview

The Up-Flo® Filter is a modular high-rate stormwater filtration device. As shown below, it is typically installed into a 4-ft diameter catch basin structure. Each Filter Module has a screen and support bracket that is attached to the concrete manhole and each contains a Media Pack that includes Flow Distribution Media and two Media Bags (Fig.1). Modules can attach to each other to form a "ring" of up to six modules. Up to two of the modules are attached to an Outlet Module that has a Bypass Hood and Drain Down Filter. The modular design can be supplied in different configurations depending on the application as shown in the following illustrations.

An upward flow path through the Filter Modules allows stormwater to be screened and filtered. In addition to the screening and filtering processes, gross pollutants will also settle into the sump or float to the surface of the water held within the manhole. The standard units are supplied with a 3-ft (0.9m) sump to allow for sediment and gross pollutant accumulations between maintenance intervals.

The following manual describes the operation of the Up-Flo® Filter and provides general maintenance requirements that will ensure the filter will continue to operate and perform as intended. In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo® Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the Media Pack and removal of accumulated sediment from the sump is mandatory.

Hydro International offers recommendations for certified maintenance contractors. It is hoped that owners will take advantage of this service as these contractors have been trained and certified to ensure that maintenance will be performed properly. Should the owner choose to conduct maintenance procedures themselves, it is recommended that Hydro International be contacted to discuss the following procedures and consider contracting a representative from Hydro International for the first maintenance cycle.

See page 17 for more about Hydro International's Stormwater BMP Maintenance Contractor Certification Program.

Up-Flo® Filter Components

1. Inlet Grate
2. Siphonic Bypass Hood with Floatables Baffle
3. Filter Module
4. Outlet Module
5. Media Pack
6. Angled Screen
7. Drain Down Filter Assembly (*refer to Fig.10 for closer view*)
8. Sump

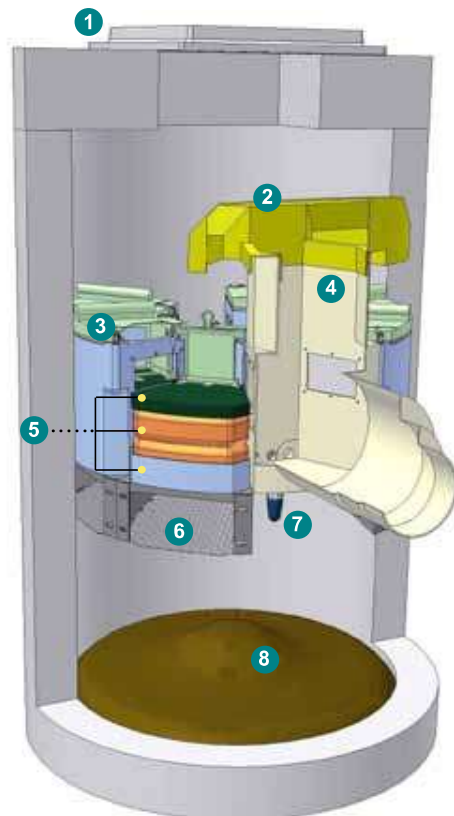


Fig.1 The components of the Up-Flo® Filter.

Operation

Introduction

The Up-Flo® Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal, Media Pack replacement and Drain Down Filter replacement.

Pollutant Capture

The Up-Flo® Filter is designed to operate as a “treatment train” by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration media, preventing surface blinding of the filter media. The Up-Flo® Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump (see Fig.2). The high-capacity bypass siphon acts as a floatables baffle to prevent washout of captured floatable pollutants during high intensity events.

Reduced Clogging

The Up-Flo® Filter has been designed to minimize the occurrence of clogging and blinding. The Up-Flo® Filter employs a unique Drain Down Filter that allows the water level in the chamber to drop below the filter media between events. The Drain Down Filter mechanism creates a reverse flow that flushes captured pollutants off the surface of the Media Bag, helping to prevent blinding. By allowing the water to drain out, the Drain Down Filter also reduces the weight of the Media Bags. This makes the bags easier and safer to remove during maintenance operations.

Overflow Protection

The Angled Screens are designed to prevent ragging and blinding. The Angled Screens are situated below the Filter Modules, sheltering them from the direct path of the influent. Coarse debris settles in the sump before the runoff flows up through the screens, protecting them from blinding. In the unlikely event of a blockage, the high capacity siphonic Bypass Hood is designed to convey high enough flow to minimize the risk of large storm creating upstream flooding.

Good Housekeeping & Best Practices

Good housekeeping practices upstream of the Up-Flo® Filter can significantly extend Media Bag life. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. Media Packs should not be installed in the Filter Modules until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged Media Bags and/or blinded Angled Screens. In that situation, the Up-Flo® Filter would go into bypass and there would be no treatment of the incoming stormwater. Because the Bypass Weir can easily convey all of the flow to the Outlet Module, there would be no lasting damage to the system. Replacement of the Media Bags and removal of sediment from the sump would restore the Up-Flo® Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

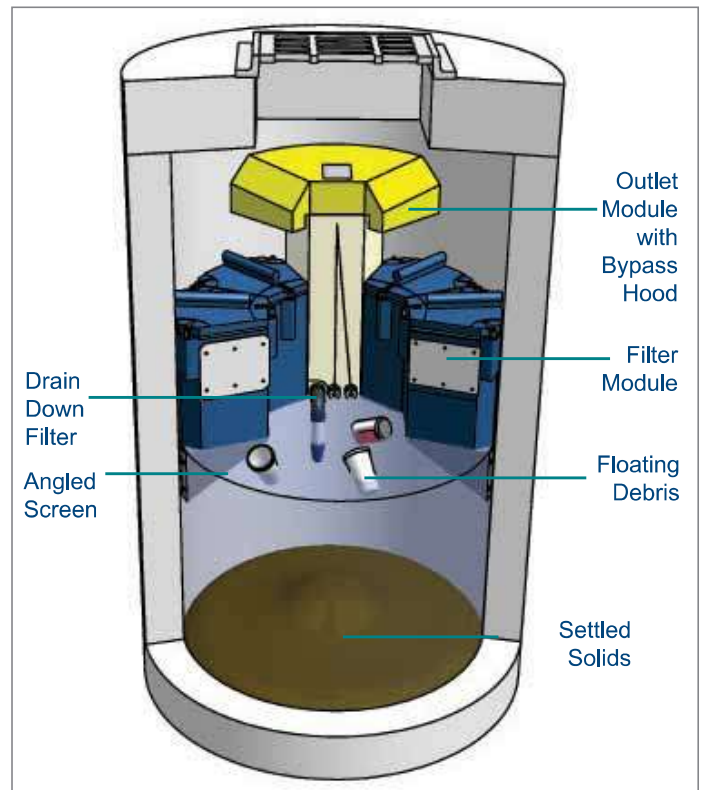


Fig.2 Pollutants captured in the Up-Flo® Filter.

Inspection & Maintenance

Overview

The Up-Flo® Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo® Filter.

Maintenance activities can be categorized as those that may be performed from outside the Up-Flo® vessel and those that are performed inside the vessel. Maintenance performed from outside the vessel includes removal of floatables and oils that have accumulated on the water surface and removal of sediment from the sump. Maintenance performed inside the vessel includes removal and replacement of Media Bags, Flow Distribution Media and the Drain Down Filter. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. OSHA Confined Space Entry procedures must be followed when entering the Up-Flo® vessel.

The Up-Flo® Filter design allows for easy and safe inspection, monitoring and clean-out procedures. It has a wide central opening between the Filter Modules for easy and comfortable access to all of the components (see Fig.3). Completion of all the maintenance activities for a typical manhole Up-Flo® Filter takes less than one hour. In the case of inspection and floatables removal, a vactor truck is not required. Otherwise, a vactor truck is normally required for oil removal, removal of sediment from the sump, and replacement of the Media Packs and Drain Down Filter. In most cases, entry into the Up-Flo® Filter vessel is required for replacement of the Media Packs and Drain Down Filter, and OSHA Confined Space Entry procedures will have to be followed.

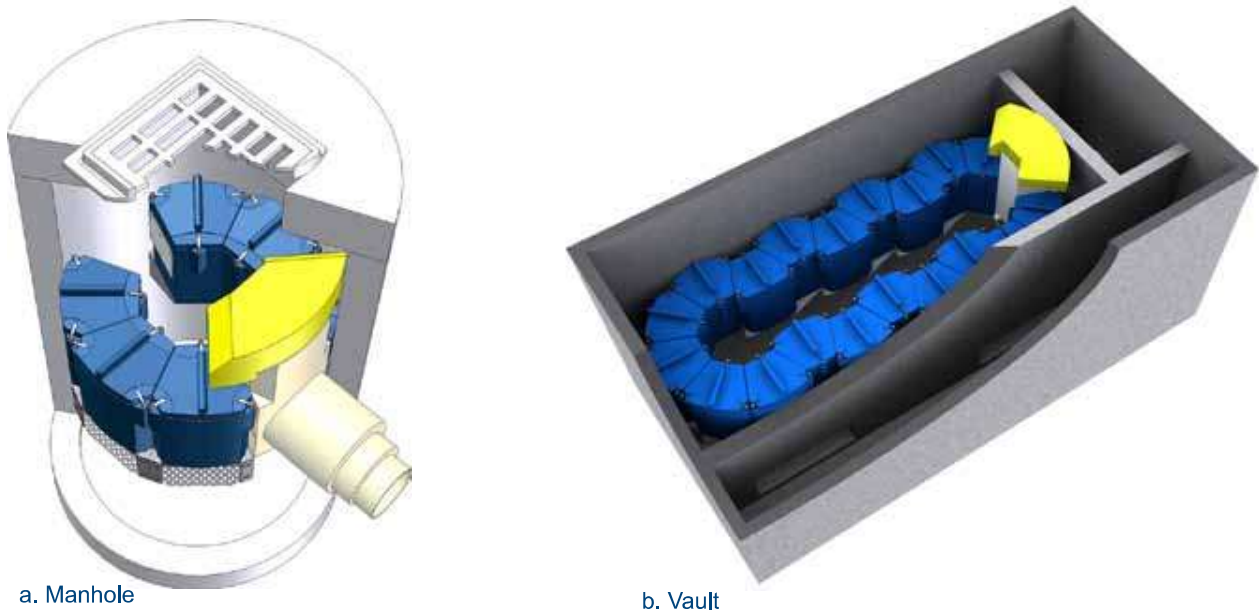


Fig.3 The Up-Flo® Filter is installed in a) 4-ft (1.2m) round manholes or b) in rectangular precast vaults. Both configurations have a wide central opening in the Up-Flo® Filter.

Maintenance activities include inspection, floatables removal, oil removal, sediment removal, Media Pack replacement, and Drain Down Filter replacement. The minimum required frequency for replacement of the Media Pack is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 16 inches, sediment removal is required.

First Year Inspection and Maintenance

The frequency of inspection and maintenance can be determined in the field after installation. The frequency of ongoing maintenance needs is based on site characteristics such as contributing area, types of surfaces (e.g., paved and/or landscaped), site activities (e.g., short-term or long-term parking), and other site maintenance (e.g., sanding and sweeping). At a minimum, inspection and maintenance should be conducted at intervals of no more than six months during the first year of operation. Maintenance personnel should observe and record pollutant accumulations during the first year of service in order to benchmark the maintenance intervals that will later be established for the site. Pollutant accumulations should be measured or monitored using the following procedures:

- **Measurement of sediment depth in the sump:** A minimum of 8 inches (20 cm) should separate the Drain Down Filter inlet from stored sediment in the sump in order to minimize sediment migration into the Drain Down Filter. A simple probe, such as the Sludge-Judge®, can be used to determine the depth of the solids in the sump. In a typical 4-ft (1.2m) diameter manhole installation, the sediment depth should be no more than 16 inches (41 cm).
- **Maintenance personnel should then enter the structure, remove the Media Pack from one of the Filter Modules, and weigh the Media Bags.** Media Bags with a wet weight of approximately 40 lbs (18 kg) or more are an indication that the filter media has become full and that the Media Packs in all of the Filter Modules will require replacement (Fig.4). Minimum filtration rate is generally reached when the Media Bags have accumulated approximately 20 lbs (9 kg) of sediment. Determining the amount of accumulated sediment will be accomplished by removing both of the Media Bags from one of the Media Packs and weighing the bags separately. Since a new Media Bag weighs approximately 30 lbs (14 kg) wet, the difference in weight will approximately equal the weight of solids that have accumulated in the bag. A spent Media Bag weighs approximately 50 lbs (23 kg) wet.
- **Measurement of oil layer on water surface:** Since water in the Up-Flo® vessel drains down to an elevation below the bottom of the Filter Modules when the system is idle, the amount of accumulated oil must be minimized so that oil is not entrained in the Media Pack when stormwater begins to fill the vessel at the start of a storm event. Oil accumulation should be limited to 1.5 inches (4 cm) or less. Probes can be used to measure oil thickness.
- **Monitoring for Drain Down Filter clogging:** The water level in the Up-Flo® Filter should be monitored to ensure that the Drain Down Filter is operating properly. The Drain Down Filter is designed to lower the water level in the Up-Flo® vessel to an elevation below the bottom of the Filter Modules between storm events. Periodically conduct an inspection one to two days after a storm event during the first year of operation. Approximately 36 hours after a 1-in (2.5-cm) rainfall, the water level inside the vessel should have dropped to a point where it is equal with the base of the Filter Modules. If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris (Fig.5 a and b). If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.
- **Monitoring for slime and debris covering the Flow Distribution Media or Angled Screens:** After removal of the Media Bags, the bottom Flow Distribution Media should be removed and inspected to determine if it is coated with slime or debris. Similarly, the Angled Screen should be inspected for blockages and ragging.



Fig.4 a) A new Media Bag of Hydro Filter Sand. b) A spent media bag of Hydro Filter Sand.

- Monitoring for floatables on the water surface: Similar to oil, the amount of accumulated floatables must be minimized to prevent trash and loose debris from becoming trapped on the Angled Screens when stormwater begins to fill the Up-Flo® vessel at the start of a storm event. Visual inspection is adequate to determine the amount of floatables. Floatables should be removed before they form a mat on the surface of the water.

The solids loading rate in the sump will be calculated by measuring the sediment depth in the sump and dividing the depth by the correlating interval of time since the sump was last cleaned. Similarly, starting with fresh Media Bags, the solids loading rate in the Media Packs will be calculated by weighing the Media Bags and dividing the weights by the correlating interval of time since they were installed. The wet weight of the heaviest bag will be used to determine the loading rate. As previously mentioned, a spent Media Bag weighs approximately 50 lbs (23 kg) wet. The spent Media Bag weight estimate was based on calculations of sediment loading in an Up-Flo® Filter that was run to exhaustion during laboratory testing.

The rate of oil accumulation will be calculated by measuring the thickness of the oil layer and dividing the thickness by the correlating interval of time since the sump was last cleaned. Ordinarily, oil thickness will not be measurable unless a spill has occurred. Consequently, any oil will typically be removed along with water when cleaning the sump.

Monitoring the Drain Down Filter for clogging, monitoring the Flow Distribution Media and Angled Screens for slime and debris, and monitoring the accumulation of floatables will provide an estimate of how long the Up-Flo® Filter can operate before its performance can become impaired by one of these factors.

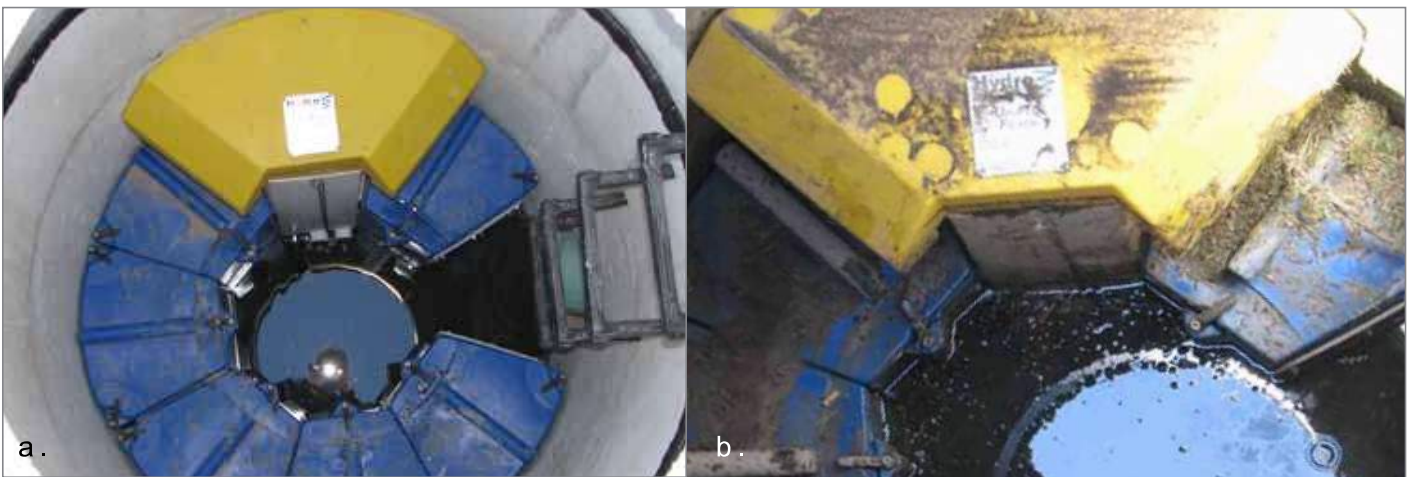


Fig.5 a) The water level in a properly functioning Up-Flo® Filter will drain down to the base of the Filter Modules. b) When the Drain Down Filter becomes clogged, the base of the Filter Modules will be submerged in standing water. Note, above right, that the Drain Down Filter is submerged in standing water.

Routine Inspection and Maintenance

After completion of the first year of operation, determining and then following the established inspection and maintenance intervals will keep pollutant loadings within their respective limits. Removal of oils and floatables, replacement of the Drain Down Filter, replacement of Flow Distribution Media (see Fig.9, pg 11), and cleaning of Angled Screens will occur at the same frequency as cleaning of the sump and replacement of Media Bags unless the first year of operation indicates otherwise. Keeping to the established maintenance intervals will keep treatment flow rates at, or above, the design flow rate. Typically, annual maintenance is adequate.

In addition to scheduled maintenance, occasional checks for Up-Flo® Filter clogging can be performed by removing the manhole cover during a storm, monitoring the water level in the manhole or vault, and determining whether the filter is in bypass. A properly-sized filter (on-line or off-line) that is in bypass during a storm that is producing runoff at, or below, the filter's design filtration rate needs maintenance.

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo® Filter and its components prior to inspection.

Scheduling

- Inspection may be conducted during any season of the year but should occur shortly after a predicted rainfall to ensure components are operating properly.

Recommended Equipment

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Scale to measure the weight of the Media Bags
- Crow bar to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge-Judge®)
- Hydro International Up-Flo® Filter Maintenance Log
- Trash bags for removed floatables

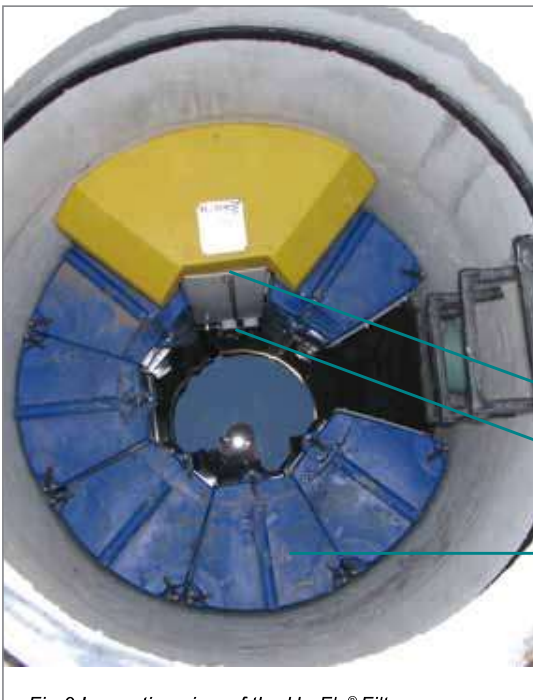


Fig.6 Inspection view of the Up-Flo® Filter.

Bypass siphon sits evenly on Outlet Module.

Standing water level is no higher than the base of the Filter Module. The Drain Down Filter will be visible if the water level is correct.

Filter Module Lids are closed.

Routine Inspection Procedures

1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside and to determine whether the high-water level indicator has been activated. Make note of any irregularities. See Fig.6 for a typical Inspection View.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe such as a Sludge-Judge®, measure the depth of sediment that has collected in the sump of the vessel.
Maximum sediment depth is 16 inches (41 cm).
6. If the high-water level indicator has been activated after two consecutive storms, remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (*refer to page 11 Replacement Procedures*). Weigh the Media Bags from one or two modules. Media Bags should be replaced if the wet weight exceeds 40 lbs (18 kg).
7. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level (see Fig.6 for the standard standing water level).
8. Securely replace the grate or lid.
9. Remove safety equipment.
10. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during inspection.

Routine Maintenance

Maintenance activities are grouped into two categories:

- **Activities *Not Requiring Man Entry Into the Up-Flo® Filter***
These activities include floatables removal, oil removal and removal of sediment from the sump.
- **Activities *Requiring Man Entry Into the Up-Flo® Filter***
Media Pack replacement and Drain Down Filter replacement.

Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others. In the case of floatables removal, a vactor truck is not required. Floatables and loose debris can be netted with a skimmer and pole.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the Media Packs and Drain Down Filter (Fig.7). All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

Completion of all the maintenance activities for a typical 4-ft (1.2m) diameter manhole installation takes less than one hour. Approximately 360 gallons of water and up to 0.6 yd³ (0.5 m³) of sediment may be removed in the process. In an installation equipped with six Filter Modules, 12 Media Bags (2 bags per module) would be removed and replaced. Assuming a spent Media Bag weight of 50 lbs (23 kg), up to 600 lbs (272 kg) of spent Media Bags would be removed. All consumables, including Media Bags, Flow Distribution Media, and replacement Drain Down Filters are supplied by Hydro International.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.



Fig.7 Sediment is removed from the sump with a vactor hose. Man entry is not required for this step.

Maintenance Activities Not Requiring Man Entry

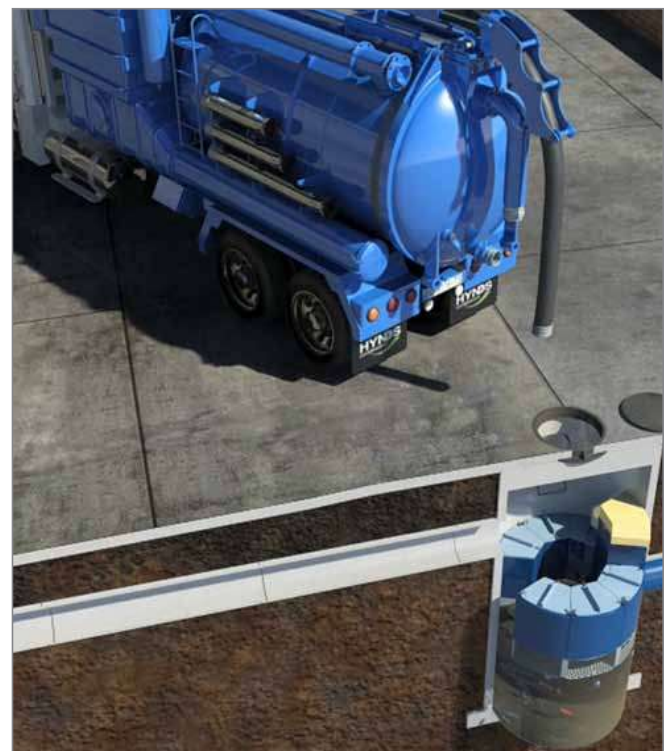
These activities include floatables removal, oil removal and removal of sediment from the sump.

Scheduling

- Floatables and sump cleanout may typically be done during any season of the year - before and after rainy season
- Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment or other screen-cleaning device
- Hydro International Up-Flo® Filter Maintenance Log



Maintenance Procedures Not Requiring Man Entry: Floatables, Oil and Sediment Clean Out

1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. If the standing water level in the sump is above the base of the Filter Modules (see Fig.8), tug the Pull Chain(s) to release the Drain Down Filter plug(s). Allow the excess water to drain out of the chamber.
5. Use the skimmer pole to fit the Drain Down Filter plug back into the open port.
6. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor. Up to 0.3 yd³ (0.2 m³) of sediment and 360 gallons (1,363 L) of water will be removed from a typical manhole Up-Flo® Filter during this process.
7. Retract the vactor hose from the vessel.
8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragging materials from the surface using a hose or other screen-cleaning device.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
10. Securely replace the grate or lid. Remove safety equipment.
11. Dispose of sediment and gross debris following local regulations.
12. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.
13. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during cleanout.

Maintenance Activities Requiring Man Entry

These activities include replacement of the Media Packs and Drain Down Filter.

Unless the Up-Flo® Filter has been installed as a very shallow unit, it is necessary to have an OSHA-confined space entry trained person enter the vessel to replace Media Packs.

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and remove and replace Media Packs. The same access would be used for maintenance personnel working from the surface to net or skim debris and floatables or to vactor out sediment, oil, and water. Unless the Up-Flo® Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Scheduling

- Call Hydro International to order replacement Media Packs and Drain Down Filter prior to scheduling maintenance.
- Because Media Pack replacement requires entry into the Up-Flo® chamber, maintenance events should be scheduled during dry weather.
- Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.

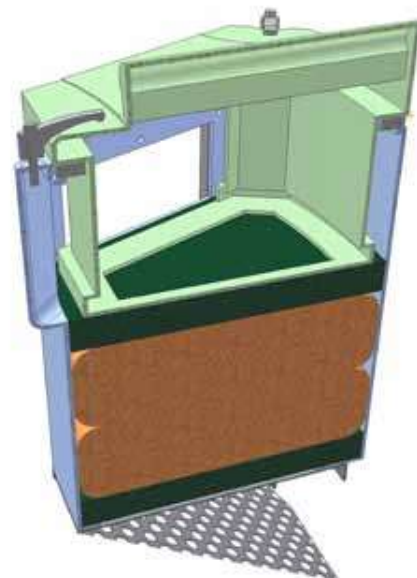


Fig.8 Cutaway view of the Filter Module

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if floatables removal is not to be done with vacator hose)
- Sediment probe (such as a Sludge-Judge®)
- Vacator truck (flexible hose preferred)
- OSHA Confined Space Entry Equipment
- Up-Flo® Filter Replacement Media Packs (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)
- Replacement Drain Down Filter components supplied by Hydro International

*Maintenance Procedures Requiring Man Entry:
Media Pack and Drain Down Filter Replacement Procedures*

1. Follow Floatables and Sump Cleanout Procedures, 1 – 13.

2. Following OSHA Confined Space Entry procedures, enter the Up-Flo® Filter Chamber.
3. Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid 1 to gain access to the Media Pack (Fig.9).
4. Remove and discard the spent Media Pack. The Media Pack contents include:
 - A top layer of green 2 Flow Distributing Media.
 - Two (2) Media Bags 3 equipped with nylon handles.
 - A bottom layer of green 2 Flow Distributing Media.
5. Insert a new Media Pack, supplied by Hydro International.
 - First, insert a bottom layer of green Flow Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
 - Next, insert the first of two (2) replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
 - Insert the second Media Bag, following the same procedure.

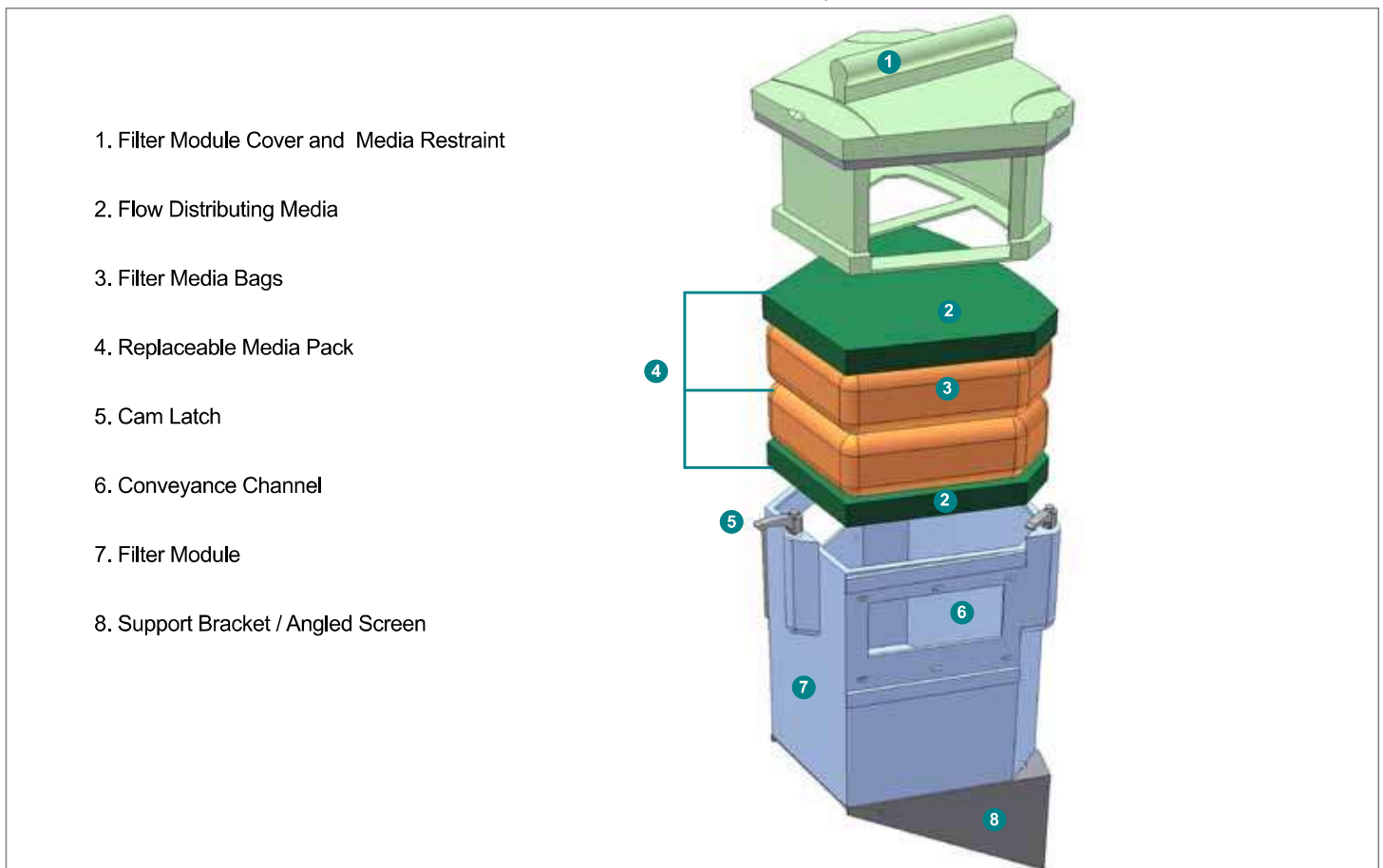


Fig.9 The Filter Module houses the Media Restraint and the Media Pack.

- Insert the top layer of green Flow Distributing Media. Be sure that the piece fits snugly against the walls and corners of the Filter Module.
 - Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.
6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module (see Fig.10). **DO NOT DISCARD THIS PIECE.**
 7. Install new Drain Down Filter supplied by Hydro International.
 8. Exit the Up-Flo® Filter chamber and securely replace the grate or lid.
 9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of Media Packs replaced. Note any irregularities such as damaged components or blockages.

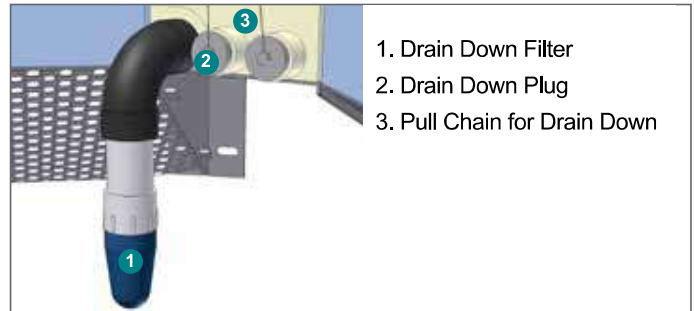


Fig.10 The Drain Down Filter.

10. Remove safety equipment.
11. Dispose of spent media packs at your local landfill, following local regulations.
12. Return the spent Drain Down Filter to Hydro International.
13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Solids Disposal

Sediment, floatables, gross debris, and spent Media Bags can generally be disposed of at the local landfill in accordance with local regulations. The toxicity of the residues captured will depend on the activities in the contributing drainage area, and testing of the residues may be required if they are considered potentially hazardous.

Sump water can generally be disposed of at a licensed water treatment facility but the local sewer authority should be contacted for permission prior to discharging the liquid. Significant accumulations of oil removed separately from sump water should be transported to a licensed hazardous waste treatment facility for treatment or disposal. **In all cases, local regulators should be contacted about disposal requirements.**

Maintenance at a Glance

Activity	Frequency
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	- Every six to 12 months, depending on the Up-Flo® Filter Configuration - The maximum allowable sediment depth in any Up-Flo Filter configuration is 16 inches (41 cm) - Following a contaminated spill in the drainage area
Media Pack Replacement	- Once per year - Replacement is required anytime inspection reveals that the high-water level indicator has been activated after two consecutive storms and the subsequent weighing of the Media Bags shows a wet weight greater than 40 lbs - Following a contaminated spill in the drainage area
Drain Down Filter Replacement	- Once per year with Media Pack replacement - Replacement is required anytime inspection reveals that the water level inside the vessel has not reached a level equal with the base of the Filter Modules approximately 36 hours after a 1-inch (2.5 cm) rainfall - As needed, in the event of continuous base flow conditions

Up-Flo® Filter Installation Log



SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATION:	
OWNER:	SITE CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

CONFIGURATION (CIRCLE ONE): **MANHOLE** **VAULT SYSTEM**

TOTAL NUMBER OF UP-FLO® FILTER MODULES: _____



Up-Flo® Filter Inspection Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions*: _____
 *(Stable, Under Construction, Needing Maintenance, etc.)

Inspection Frequency Key: A=annual; M=monthly; S=after major storms

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	M			
Inlets and Outlets free of debris?	M			
Facility (internally) free of debris?	M			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material into Up-Flo® Filter)	A			
Grass mowed?	M			
Water retention where required				
Water holding chamber(s) at normal pool?	A			
Evidence of erosion?	A			
Sediment Deposition				
Filtration Chamber free of sediments?	A			
Sedimentation sump not more than 50% full?	A			
Structural Components				
Any evidence of structural deterioration?	A			
Grates in good condition?	A			
Spalling or cracking of structural parts?	A			
Outlet/Overflow Spillway	A			
Other				
Noticeable odors?	A			
Any evidence of filter(s) clogging?	M			
Evidence of flow bypassing facility?	A			



Inspector Comments: _____

Overall Condition of Up-Flo® Filter**: Acceptable Unacceptable

**"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 15 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is schedule for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____



Up-Flo® Filter Maintenance Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions: _____
**(Stable, Under Construction, Needing Maintenance, etc.)*

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Modules fitted with new media packs: _____

Inspector Comments: _____

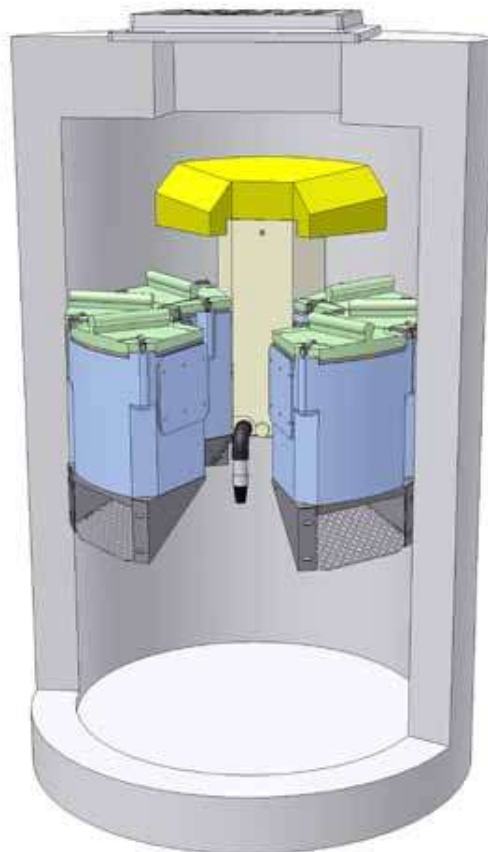
Overall Condition of Up-Flo® Filter: Acceptable Unacceptable

***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

Maintained by: (signature) _____

Maintained by: (printed) _____





Operation and Maintenance Manual

Up-Flo[®] Filter

Filtration System for Stormwater Treatment

Stormwater Solutions
Turning Water Around ...[®]

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IMPORTANT - ORDER REPLACEMENT PARTS FOR MAINTENANCE - IMPORTANT

Annual maintenance requires replacement of the Media Packs and the Drain Down Filter. Contact Hydro International to order replacements. Allow 2-4 weeks for delivery.

Office hours Monday thru Friday 8:00 A.M. to 5:00 P.M. EST
 Toll free: 1-800-848-2706
 Phone: 207-756-6200
 Fax: 207-756-6212
 Email: stormwaterinquiry@hydro-int.com

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DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's Up-Flo® Filter. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc have a policy of continuous product development and reserve the right to amend specifications without notice.



Product Overview

The Up-Flo® Filter is a modular high-rate stormwater filtration device. As shown below, it is typically installed into a 4-ft diameter catch basin structure. Each Filter Module has a screen and support bracket that is attached to the concrete manhole and each contains a Media Pack that includes Flow Distribution Media and two Media Bags (Fig.1). Modules can attach to each other to form a "ring" of up to six modules. Up to two of the modules are attached to an Outlet Module that has a Bypass Hood and Drain Down Filter. The modular design can be supplied in different configurations depending on the application as shown in the following illustrations.

An upward flow path through the Filter Modules allows stormwater to be screened and filtered. In addition to the screening and filtering processes, gross pollutants will also settle into the sump or float to the surface of the water held within the manhole. The standard units are supplied with a 3-ft (0.9m) sump to allow for sediment and gross pollutant accumulations between maintenance intervals.

The following manual describes the operation of the Up-Flo® Filter and provides general maintenance requirements that will ensure the filter will continue to operate and perform as intended. In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo® Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the Media Pack and removal of accumulated sediment from the sump is mandatory.

Hydro International offers recommendations for certified maintenance contractors. It is hoped that owners will take advantage of this service as these contractors have been trained and certified to ensure that maintenance will be performed properly. Should the owner choose to conduct maintenance procedures themselves, it is recommended that Hydro International be contacted to discuss the following procedures and consider contracting a representative from Hydro International for the first maintenance cycle.

See page 17 for more about Hydro International's Stormwater BMP Maintenance Contractor Certification Program.

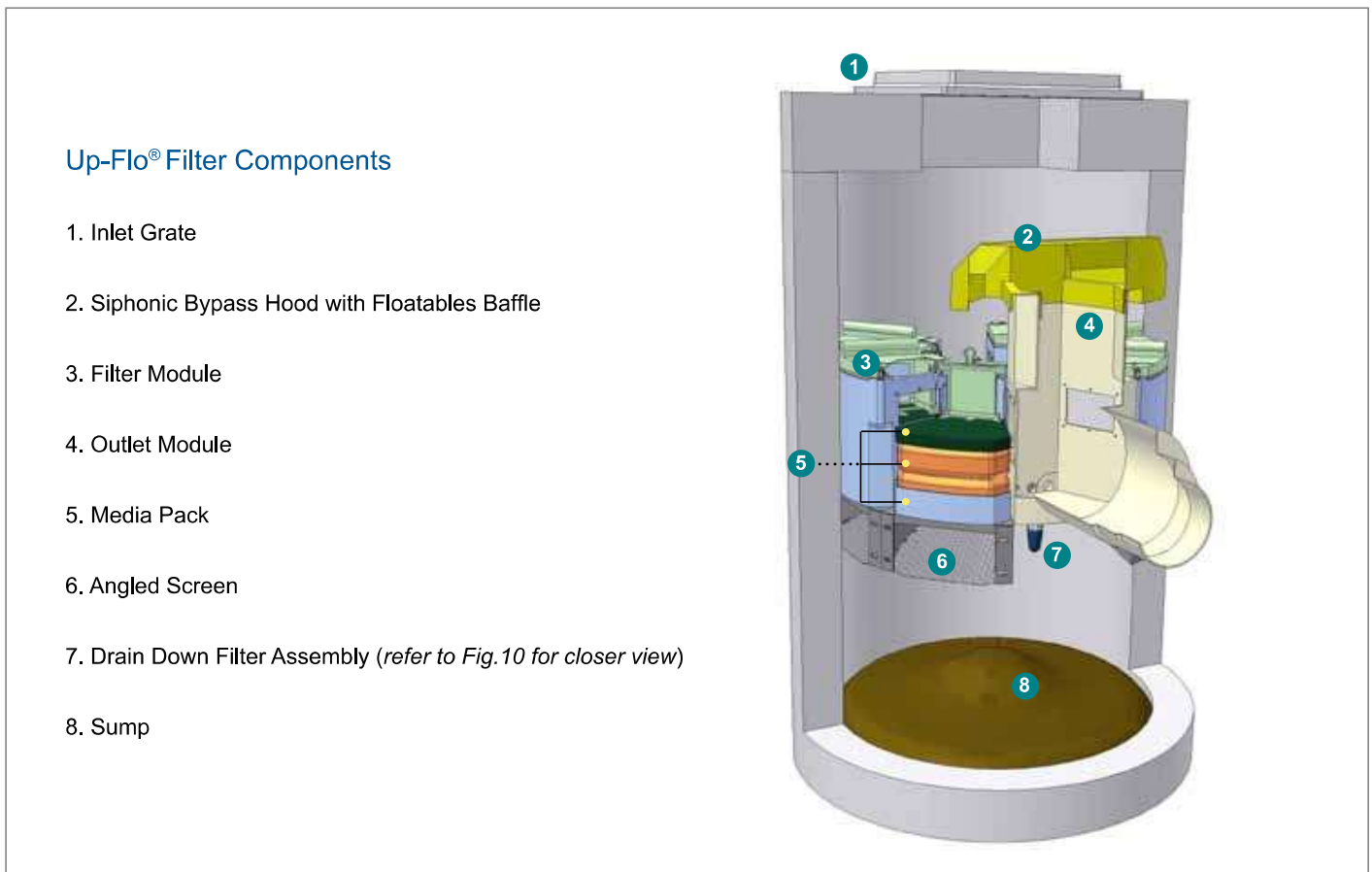


Fig.1 The components of the Up-Flo® Filter.

Operation

Introduction

The Up-Flo® Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal, Media Pack replacement and Drain Down Filter replacement.

Pollutant Capture

The Up-Flo® Filter is designed to operate as a “treatment train” by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration media, preventing surface blinding of the filter media. The Up-Flo® Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump (see Fig.2). The high-capacity bypass siphon acts as a floatables baffle to prevent washout of captured floatable pollutants during high intensity events.

Reduced Clogging

The Up-Flo® Filter has been designed to minimize the occurrence of clogging and blinding. The Up-Flo® Filter employs a unique Drain Down Filter that allows the water level in the chamber to drop below the filter media between events. The Drain Down Filter mechanism creates a reverse flow that flushes captured pollutants off the surface of the Media Bag, helping to prevent blinding. By allowing the water to drain out, the Drain Down Filter also reduces the weight of the Media Bags. This makes the bags easier and safer to remove during maintenance operations.

Overflow Protection

The Angled Screens are designed to prevent ragging and blinding. The Angled Screens are situated below the Filter Modules, sheltering them from the direct path of the influent. Coarse debris settles in the sump before the runoff flows up through the screens, protecting them from blinding. In the unlikely event of a blockage, the high capacity siphonic Bypass Hood is designed to convey high enough flow to minimize the risk of large storm creating upstream flooding.

Good Housekeeping & Best Practices

Good housekeeping practices upstream of the Up-Flo® Filter can significantly extend Media Bag life. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. Media Packs should not be installed in the Filter Modules until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged Media Bags and/or blinded Angled Screens. In that situation, the Up-Flo® Filter would go into bypass and there would be no treatment of the incoming stormwater. Because the Bypass Weir can easily convey all of the flow to the Outlet Module, there would be no lasting damage to the system. Replacement of the Media Bags and removal of sediment from the sump would restore the Up-Flo® Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

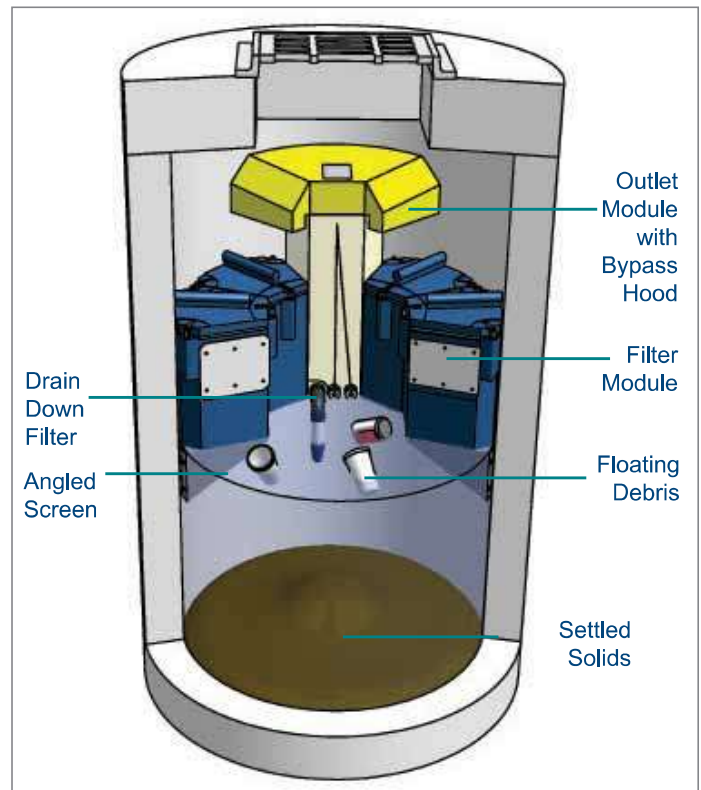


Fig.2 Pollutants captured in the Up-Flo® Filter.

Inspection & Maintenance

Overview

The Up-Flo® Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo® Filter.

Maintenance activities can be categorized as those that may be performed from outside the Up-Flo® vessel and those that are performed inside the vessel. Maintenance performed from outside the vessel includes removal of floatables and oils that have accumulated on the water surface and removal of sediment from the sump. Maintenance performed inside the vessel includes removal and replacement of Media Bags, Flow Distribution Media and the Drain Down Filter. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. OSHA Confined Space Entry procedures must be followed when entering the Up-Flo® vessel.

The Up-Flo® Filter design allows for easy and safe inspection, monitoring and clean-out procedures. It has a wide central opening between the Filter Modules for easy and comfortable access to all of the components (see Fig.3). Completion of all the maintenance activities for a typical manhole Up-Flo® Filter takes less than one hour. In the case of inspection and floatables removal, a vactor truck is not required. Otherwise, a vactor truck is normally required for oil removal, removal of sediment from the sump, and replacement of the Media Packs and Drain Down Filter. In most cases, entry into the Up-Flo® Filter vessel is required for replacement of the Media Packs and Drain Down Filter, and OSHA Confined Space Entry procedures will have to be followed.

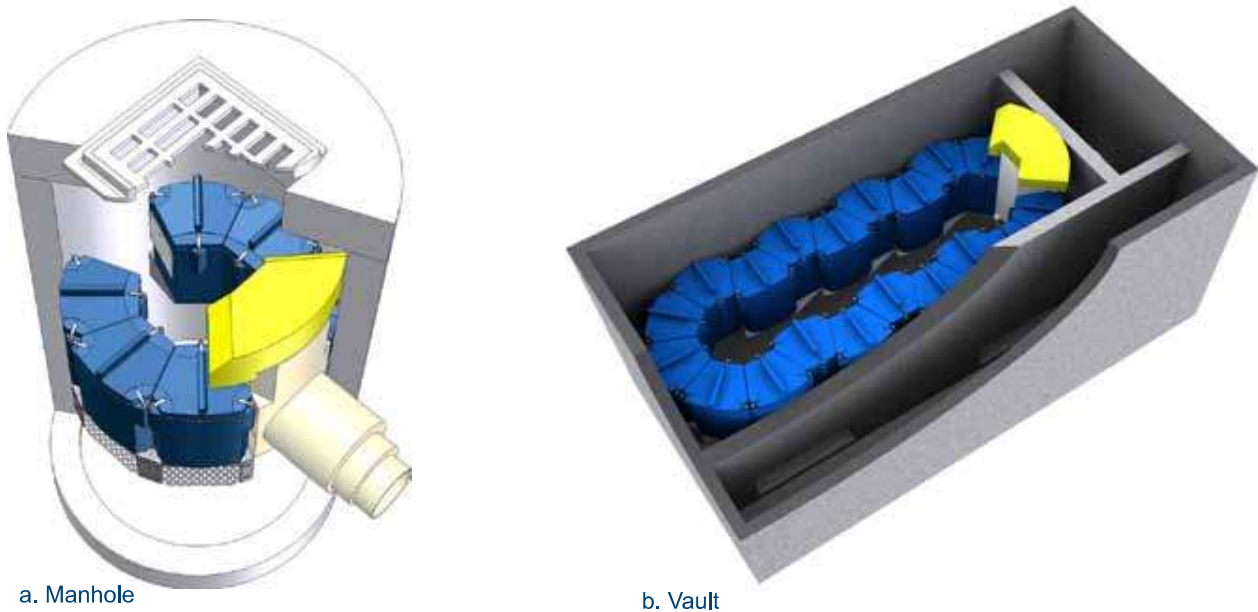


Fig.3 The Up-Flo® Filter is installed in a) 4-ft (1.2m) round manholes or b) in rectangular precast vaults. Both configurations have a wide central opening in the Up-Flo® Filter.

Maintenance activities include inspection, floatables removal, oil removal, sediment removal, Media Pack replacement, and Drain Down Filter replacement. The minimum required frequency for replacement of the Media Pack is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 16 inches, sediment removal is required.

First Year Inspection and Maintenance

The frequency of inspection and maintenance can be determined in the field after installation. The frequency of ongoing maintenance needs is based on site characteristics such as contributing area, types of surfaces (e.g., paved and/or landscaped), site activities (e.g., short-term or long-term parking), and other site maintenance (e.g., sanding and sweeping). At a minimum, inspection and maintenance should be conducted at intervals of no more than six months during the first year of operation. Maintenance personnel should observe and record pollutant accumulations during the first year of service in order to benchmark the maintenance intervals that will later be established for the site. Pollutant accumulations should be measured or monitored using the following procedures:

- **Measurement of sediment depth in the sump:** A minimum of 8 inches (20 cm) should separate the Drain Down Filter inlet from stored sediment in the sump in order to minimize sediment migration into the Drain Down Filter. A simple probe, such as the Sludge-Judge®, can be used to determine the depth of the solids in the sump. In a typical 4-ft (1.2m) diameter manhole installation, the sediment depth should be no more than 16 inches (41 cm).
- **Maintenance personnel should then enter the structure, remove the Media Pack from one of the Filter Modules, and weigh the Media Bags.** Media Bags with a wet weight of approximately 40 lbs (18 kg) or more are an indication that the filter media has become full and that the Media Packs in all of the Filter Modules will require replacement (Fig.4). Minimum filtration rate is generally reached when the Media Bags have accumulated approximately 20 lbs (9 kg) of sediment. Determining the amount of accumulated sediment will be accomplished by removing both of the Media Bags from one of the Media Packs and weighing the bags separately. Since a new Media Bag weighs approximately 30 lbs (14 kg) wet, the difference in weight will approximately equal the weight of solids that have accumulated in the bag. A spent Media Bag weighs approximately 50 lbs (23 kg) wet.
- **Measurement of oil layer on water surface:** Since water in the Up-Flo® vessel drains down to an elevation below the bottom of the Filter Modules when the system is idle, the amount of accumulated oil must be minimized so that oil is not entrained in the Media Pack when stormwater begins to fill the vessel at the start of a storm event. Oil accumulation should be limited to 1.5 inches (4 cm) or less. Probes can be used to measure oil thickness.
- **Monitoring for Drain Down Filter clogging:** The water level in the Up-Flo® Filter should be monitored to ensure that the Drain Down Filter is operating properly. The Drain Down Filter is designed to lower the water level in the Up-Flo® vessel to an elevation below the bottom of the Filter Modules between storm events. Periodically conduct an inspection one to two days after a storm event during the first year of operation. Approximately 36 hours after a 1-in (2.5-cm) rainfall, the water level inside the vessel should have dropped to a point where it is equal with the base of the Filter Modules. If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris (Fig.5 a and b). If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.
- **Monitoring for slime and debris covering the Flow Distribution Media or Angled Screens:** After removal of the Media Bags, the bottom Flow Distribution Media should be removed and inspected to determine if it is coated with slime or debris. Similarly, the Angled Screen should be inspected for blockages and ragging.



Fig.4 a) A new Media Bag of Hydro Filter Sand. b) A spent media bag of Hydro Filter Sand.

- Monitoring for floatables on the water surface: Similar to oil, the amount of accumulated floatables must be minimized to prevent trash and loose debris from becoming trapped on the Angled Screens when stormwater begins to fill the Up-Flo® vessel at the start of a storm event. Visual inspection is adequate to determine the amount of floatables. Floatables should be removed before they form a mat on the surface of the water.

The solids loading rate in the sump will be calculated by measuring the sediment depth in the sump and dividing the depth by the correlating interval of time since the sump was last cleaned. Similarly, starting with fresh Media Bags, the solids loading rate in the Media Packs will be calculated by weighing the Media Bags and dividing the weights by the correlating interval of time since they were installed. The wet weight of the heaviest bag will be used to determine the loading rate. As previously mentioned, a spent Media Bag weighs approximately 50 lbs (23 kg) wet. The spent Media Bag weight estimate was based on calculations of sediment loading in an Up-Flo® Filter that was run to exhaustion during laboratory testing.

The rate of oil accumulation will be calculated by measuring the thickness of the oil layer and dividing the thickness by the correlating interval of time since the sump was last cleaned. Ordinarily, oil thickness will not be measurable unless a spill has occurred. Consequently, any oil will typically be removed along with water when cleaning the sump.

Monitoring the Drain Down Filter for clogging, monitoring the Flow Distribution Media and Angled Screens for slime and debris, and monitoring the accumulation of floatables will provide an estimate of how long the Up-Flo® Filter can operate before its performance can become impaired by one of these factors.

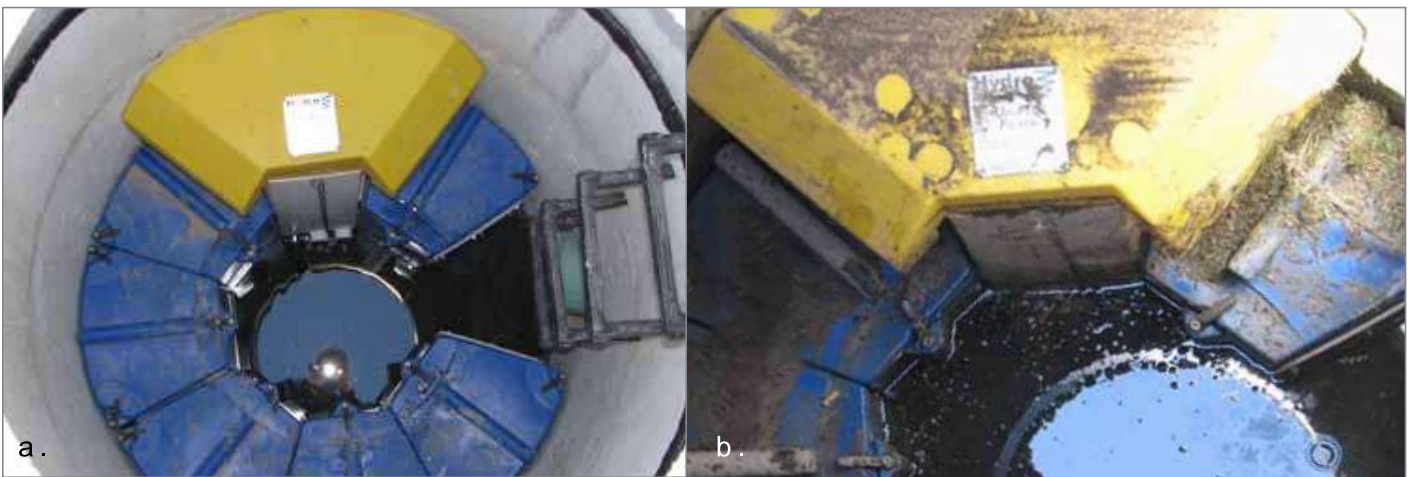


Fig.5 a) The water level in a properly functioning Up-Flo® Filter will drain down to the base of the Filter Modules. b) When the Drain Down Filter becomes clogged, the base of the Filter Modules will be submerged in standing water. Note, above right, that the Drain Down Filter is submerged in standing water.

Routine Inspection and Maintenance

After completion of the first year of operation, determining and then following the established inspection and maintenance intervals will keep pollutant loadings within their respective limits. Removal of oils and floatables, replacement of the Drain Down Filter, replacement of Flow Distribution Media (see Fig.9, pg 11), and cleaning of Angled Screens will occur at the same frequency as cleaning of the sump and replacement of Media Bags unless the first year of operation indicates otherwise. Keeping to the established maintenance intervals will keep treatment flow rates at, or above, the design flow rate. Typically, annual maintenance is adequate.

In addition to scheduled maintenance, occasional checks for Up-Flo® Filter clogging can be performed by removing the manhole cover during a storm, monitoring the water level in the manhole or vault, and determining whether the filter is in bypass. A properly-sized filter (on-line or off-line) that is in bypass during a storm that is producing runoff at, or below, the filter's design filtration rate needs maintenance.

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo® Filter and its components prior to inspection.

Scheduling

- Inspection may be conducted during any season of the year but should occur shortly after a predicted rainfall to ensure components are operating properly.

Recommended Equipment

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Scale to measure the weight of the Media Bags
- Crow bar to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge-Judge®)
- Hydro International Up-Flo® Filter Maintenance Log
- Trash bags for removed floatables

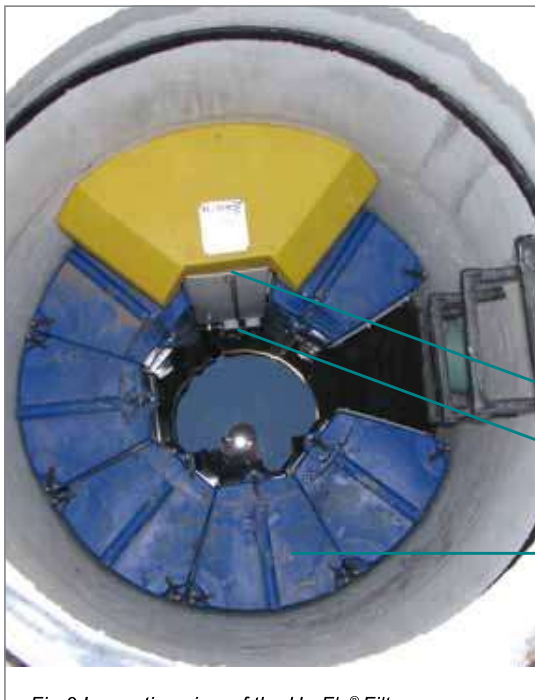


Fig.6 Inspection view of the Up-Flo® Filter.

Bypass siphon sits evenly on Outlet Module.

Standing water level is no higher than the base of the Filter Module. The Drain Down Filter will be visible if the water level is correct.

Filter Module Lids are closed.

Routine Inspection Procedures

1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside and to determine whether the high-water level indicator has been activated. Make note of any irregularities. See Fig.6 for a typical Inspection View.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe such as a Sludge-Judge®, measure the depth of sediment that has collected in the sump of the vessel.
Maximum sediment depth is 16 inches (41 cm).
6. If the high-water level indicator has been activated after two consecutive storms, remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (*refer to page 11 Replacement Procedures*). Weigh the Media Bags from one or two modules. Media Bags should be replaced if the wet weight exceeds 40 lbs (18 kg).
7. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level (see Fig.6 for the standard standing water level).
8. Securely replace the grate or lid.
9. Remove safety equipment.
10. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during inspection.

Routine Maintenance

Maintenance activities are grouped into two categories:

- **Activities *Not Requiring Man Entry Into the Up-Flo® Filter***
These activities include floatables removal, oil removal and removal of sediment from the sump.
- **Activities *Requiring Man Entry Into the Up-Flo® Filter***
Media Pack replacement and Drain Down Filter replacement.

Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others. In the case of floatables removal, a vactor truck is not required. Floatables and loose debris can be netted with a skimmer and pole.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the Media Packs and Drain Down Filter (Fig.7). All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

Completion of all the maintenance activities for a typical 4-ft (1.2m) diameter manhole installation takes less than one hour. Approximately 360 gallons of water and up to 0.6 yd³ (0.5 m³) of sediment may be removed in the process. In an installation equipped with six Filter Modules, 12 Media Bags (2 bags per module) would be removed and replaced. Assuming a spent Media Bag weight of 50 lbs (23 kg), up to 600 lbs (272 kg) of spent Media Bags would be removed. All consumables, including Media Bags, Flow Distribution Media, and replacement Drain Down Filters are supplied by Hydro International.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.



Fig.7 Sediment is removed from the sump with a vactor hose. Man entry is not required for this step.

Maintenance Activities Not Requiring Man Entry

These activities include floatables removal, oil removal and removal of sediment from the sump.

Scheduling

- Floatables and sump cleanout may typically be done during any season of the year - before and after rainy season
- Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment or other screen-cleaning device
- Hydro International Up-Flo® Filter Maintenance Log



Maintenance Procedures Not Requiring Man Entry: Floatables, Oil and Sediment Clean Out

1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. If the standing water level in the sump is above the base of the Filter Modules (see Fig.8), tug the Pull Chain(s) to release the Drain Down Filter plug(s). Allow the excess water to drain out of the chamber.
5. Use the skimmer pole to fit the Drain Down Filter plug back into the open port.
6. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor. Up to 0.3 yd³ (0.2 m³) of sediment and 360 gallons (1,363 L) of water will be removed from a typical manhole Up-Flo® Filter during this process.
7. Retract the vactor hose from the vessel.
8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragging materials from the surface using a hose or other screen-cleaning device.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
10. Securely replace the grate or lid. Remove safety equipment.
11. Dispose of sediment and gross debris following local regulations.
12. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.
13. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during cleanout.

Maintenance Activities Requiring Man Entry

These activities include replacement of the Media Packs and Drain Down Filter.

Unless the Up-Flo® Filter has been installed as a very shallow unit, it is necessary to have an OSHA-confined space entry trained person enter the vessel to replace Media Packs.

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and remove and replace Media Packs. The same access would be used for maintenance personnel working from the surface to net or skim debris and floatables or to vactor out sediment, oil, and water. Unless the Up-Flo® Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Scheduling

- Call Hydro International to order replacement Media Packs and Drain Down Filter prior to scheduling maintenance.
- Because Media Pack replacement requires entry into the Up-Flo® chamber, maintenance events should be scheduled during dry weather.
- Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.

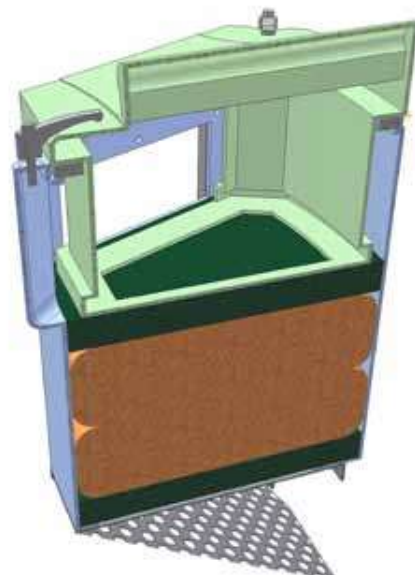


Fig.8 Cutaway view of the Filter Module

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if floatables removal is not to be done with vacator hose)
- Sediment probe (such as a Sludge-Judge®)
- Vacator truck (flexible hose preferred)
- OSHA Confined Space Entry Equipment
- Up-Flo® Filter Replacement Media Packs (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)
- Replacement Drain Down Filter components supplied by Hydro International

*Maintenance Procedures Requiring Man Entry:
Media Pack and Drain Down Filter Replacement Procedures*

1. Follow Floatables and Sump Cleanout Procedures, 1 – 13.

2. Following OSHA Confined Space Entry procedures, enter the Up-Flo® Filter Chamber.
3. Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid 1 to gain access to the Media Pack (Fig.9).
4. Remove and discard the spent Media Pack. The Media Pack contents include:
 - A top layer of green 2 Flow Distributing Media.
 - Two (2) Media Bags 3 equipped with nylon handles.
 - A bottom layer of green 2 Flow Distributing Media.
5. Insert a new Media Pack, supplied by Hydro International.
 - First, insert a bottom layer of green Flow Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
 - Next, insert the first of two (2) replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
 - Insert the second Media Bag, following the same procedure.

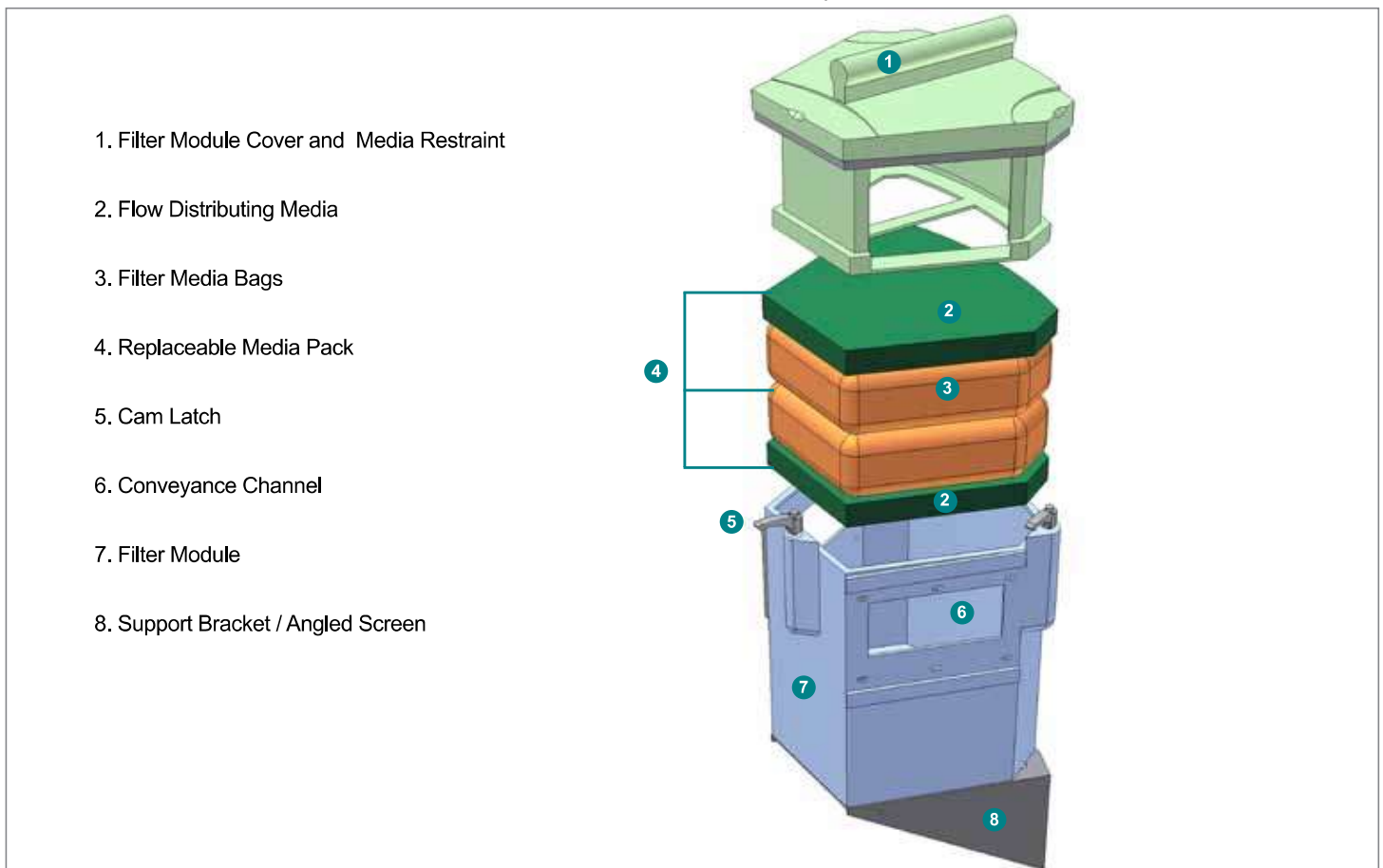


Fig.9 The Filter Module houses the Media Restraint and the Media Pack.

- Insert the top layer of green Flow Distributing Media. Be sure that the piece fits snugly against the walls and corners of the Filter Module.
 - Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.
6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module (see Fig.10). **DO NOT DISCARD THIS PIECE.**
 7. Install new Drain Down Filter supplied by Hydro International.
 8. Exit the Up-Flo® Filter chamber and securely replace the grate or lid.
 9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of Media Packs replaced. Note any irregularities such as damaged components or blockages.

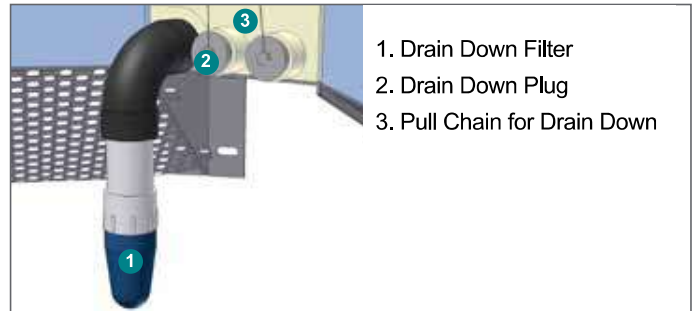


Fig.10 The Drain Down Filter.

10. Remove safety equipment.
11. Dispose of spent media packs at your local landfill, following local regulations.
12. Return the spent Drain Down Filter to Hydro International.
13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Solids Disposal

Sediment, floatables, gross debris, and spent Media Bags can generally be disposed of at the local landfill in accordance with local regulations. The toxicity of the residues captured will depend on the activities in the contributing drainage area, and testing of the residues may be required if they are considered potentially hazardous.

Sump water can generally be disposed of at a licensed water treatment facility but the local sewer authority should be contacted for permission prior to discharging the liquid. Significant accumulations of oil removed separately from sump water should be transported to a licensed hazardous waste treatment facility for treatment or disposal. **In all cases, local regulators should be contacted about disposal requirements.**

Maintenance at a Glance

Activity	Frequency
Inspection	<ul style="list-style-type: none"> - Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	<ul style="list-style-type: none"> - Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	<ul style="list-style-type: none"> - Every six to 12 months, depending on the Up-Flo® Filter Configuration - The maximum allowable sediment depth in any Up-Flo Filter configuration is 16 inches (41 cm) - Following a contaminated spill in the drainage area
Media Pack Replacement	<ul style="list-style-type: none"> - Once per year - Replacement is required anytime inspection reveals that the high-water level indicator has been activated after two consecutive storms and the subsequent weighing of the Media Bags shows a wet weight greater than 40 lbs - Following a contaminated spill in the drainage area
Drain Down Filter Replacement	<ul style="list-style-type: none"> - Once per year with Media Pack replacement - Replacement is required anytime inspection reveals that the water level inside the vessel has not reached a level equal with the base of the Filter Modules approximately 36 hours after a 1-inch (2.5 cm) rainfall - As needed, in the event of continuous base flow conditions

Up-Flo® Filter Installation Log



SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATION:	
OWNER:	SITE CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

CONFIGURATION (CIRCLE ONE): **MANHOLE** **VAULT SYSTEM**

TOTAL NUMBER OF UP-FLO® FILTER MODULES: _____



Up-Flo® Filter Inspection Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions*: _____
 *(Stable, Under Construction, Needing Maintenance, etc.)

Inspection Frequency Key: A=annual; M=monthly; S=after major storms

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	M			
Inlets and Outlets free of debris?	M			
Facility (internally) free of debris?	M			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material into Up-Flo® Filter)	A			
Grass mowed?	M			
Water retention where required				
Water holding chamber(s) at normal pool?	A			
Evidence of erosion?	A			
Sediment Deposition				
Filtration Chamber free of sediments?	A			
Sedimentation sump not more than 50% full?	A			
Structural Components				
Any evidence of structural deterioration?	A			
Grates in good condition?	A			
Spalling or cracking of structural parts?	A			
Outlet/Overflow Spillway	A			
Other				
Noticeable odors?	A			
Any evidence of filter(s) clogging?	M			
Evidence of flow bypassing facility?	A			



Inspector Comments: _____

Overall Condition of Up-Flo® Filter**: Acceptable Unacceptable

***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 15 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is schedule for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____



Up-Flo® Filter Maintenance Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions: _____
**(Stable, Under Construction, Needing Maintenance, etc.)*

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Modules fitted with new media packs: _____

Inspector Comments: _____

Overall Condition of Up-Flo® Filter: Acceptable Unacceptable
***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

Maintained by: (signature) _____

Maintained by: (printed) _____

