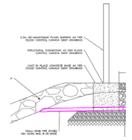
Appendix U Demountables Investigation









Cost Information

Demountable Options	AquaDam - Leyfield	Tiger Dams	Hesco Barrier	Defencell (Hesco)	Muscle Wall (Hesco)	Inero Flood Barriers	RS Demountable	Sandbags	Superbags	Concrete Blocks
Website	https://www.layfieldgroup.com/ge	https://usfloodcontrol.com/flood-b	https://www.flooddefensegroup.co	Defencecell flood prevention soluti	https://www.flooddefensegroup.co	https://www.floodcontrolcanada.com/copy-of-inero-h50		n/a	n/a	n/a
Unit cost - 1m high- $/m	CAD$106.70	CAD$496.72	US$21.41	USD$ 68.4	USD$ 104.83	CAD$677.46	CAD$802.90	CAD$97.09	CAD$108.00	CAD$777.00
Base width (m) for 1m high	2.40	2.13	0.6	2.7	0.5	1m	0.40	1m	1	1.5
Unit cost - 2m high- $/m	-	CAD$1,281.17	US$53.95	-	USD$ 599.75	CAD$1,555.05	CAD$3,042.65	CAD$291.26	CAD$324.00	CAD$1,554.00
Base width (m) for 2m high	-	4.20	1.52	4.05	1.3	1.7	1.40	2m	2	1.5
Capital	$30,000	-	-	-	-	-	-	-	-	-
Taxes	not included	included above	not included	not included	not included	not included	not included	not included	not included	not included
Shipping	not included	included above	not included	not included	not included	not included	not included	not included	not included	not included
What are they made of? How do they work?	High strength geotextile tubes, stuffed with a sized poly tube that is made from geomembrane resins. They have to be filled with water. The geomembrane tube is encased within a protective UV stabilized high strength woven geotextile that protects the inner geomembrane core from physical and UV damages.	Tiger Dam is made out of a polypropylene mixed with a nylon scrim to allow for expansion. The tubes are filled with water.	Wire cages with geotextile lining, that are then filled with sand/gravel mix	Defencell is comprised of a heavy-duty nonwoven geotextile. They are filled with sand/gravel mix. An external frame is required during construction. These can be stacked to gain flood protection elevation.	Plastic water-filled barriers that lock together to form a continuous barrier.	The flood barrier sections, support legs and foot beams are made from marine-grade aluminum. The material has high durability and withstands extremely tough outdoor conditions. The sections are erected using a sturdy aluminum support leg with a conical foot beam. The polyethylene membrane is then rolled out along the barriers and fixed with clips. The membrane must be anchored firmly to the ground using loose gravel or similar material.	Stop log system made out of aluminum. No limitations to length, and can be multi-directional. HILTI Sleeves M20 (for concrete slab foundation)	Small sand-filled plastic bags that are stacked and can be wrapped in plastic for further waterproofing	Large sand-filled plastic bags that are stacked and can be wrapped in plastic for further waterproofing	Preformed concrete blocks that can stack together and can be wrapped in plastic for further waterproofing
Do they have a good track record?	They have 25 projects on their website, first in 2014. The concept and the technology have been in use since the 1980's and have an excellent track record. Such dams are used every year in BC for flood control dams, as coffer dams etc. They were also used during the recent flood in the lower mainland BC (2021) by the Emergency Management in BC and BC municipalities also keep a healthy stock of them.	A Canadian company that has been around for over 20+ years now	This is the most popular option on the market for governmental organizations when it comes to long distances of flood protection.	Tested and approved by the USACE as a flood barrier.	n/a	15 years in the market. Installed in the U.K., Sweden, Germany and the Balkan. Flood Control Canada is the exclusive distributor for INERO TM Flood Barriers, manufactured in Sweden.	35 years in the market; 66,000 systems in 34 countries . Flood Control Canada is the exclusive distributor for all RS Products, manufactured in Germany.	Common flood protection measure	Common flood protection measure	Common flood protection measure
How fast can they be deployed?	10 times faster to install than sandbag dikes. For 30m length with 2 people takes 20 min (1.54 m/min). It is a rapid installation, simply a matter of unrolling on the crest of the dike, securing the ends, and pumping water. In reverse during removal.	A 42” Tiger Dam can be deployed in as fast as 15 mins up to 45 mins, depending on type of pump	Generally, a crew of 1 piece of earth moving machinery and 3-4 workers to support it in compacting the soils after each lift of about 30 cm, you can expect to fill 300 cubic meters of soil in a day.	n/a	With a small team of people, 30 m can be deployed in 30 minutes.	Four people can install 100 meter of the INERO Flood Barrier in less than an hour. A forklift is required to manouver the steel pallets to the location.	A forklift is required to manouver the storage trolleys to the location. ESH-LN (medium impact) 1.2 m height (4 workers) 50m in 1 hr ESH-KN (heavy impact) 2.1 m height (4 workers) 25m in 1 hr	Slow, requires many people to fill sandbags and manually place to build a dike.	Slow, requires equipment to fill with sand and place.	Relatively fast, required equipment to unload and install.
Maximum height that can be deployed	Up to 4.9 m high.	No maximum	No maximum	No maximum.	Height options: 2’, 3’, 4’, 6’, and 8’ (max 2.4m)	Standard height = 1.7 m. Higher options can be produced upon request. Existing brochure shows maximum height dimensions = 2.24 m H x 0.5m W.	The ESH-LN system can be used for heights up to 1.5 m without back braces. This is an important fact as the berm/dike top width can be limited. The ESH-KN system can be used for heights up to 4.05 m and requires back braces.	No maximum.	No maximum.	No maximum.

Freeboard requirement	30cm - for the 1.2 m option	Typical freeboard requirements are 25% freeboard, but, because Tiger Dams are anchored down, no freeboard is required and they can take overtopping.	None	None. Can take overtopping	None	None	n/a	0.6m	0.6m	None
Deployment Requirements	2-3 people to install. Water source, pump, long hose.	Pumps and hoses to draw water. Labor requirements for size of job, depending on critical time, anywhere from 20-40 people.	Machinery for filling the soil filled options.	Machinery for filling the soil filled options.	Machinery for filling the soil filled options.	No site preparation required. Assembly of the INERO system is easy and can be done with 2-4 people. No foundation required.	n/a	Many people, fill, bags	Machines to fill the bags and move them into place	Machines to move the blocks
Foundation Requirements	A smooth foundation is preferred. To keep a surface smooth and improve the bearing capacity, GeoWebs or Geogrids are recommended.	Anchors are supplied for all surface types	Suitably firm foundation free of organic material. If installing on an eroding surface, place a plastic liner prior to deployment to reduce further erosion of the foundation.	Suitably firm foundation free of organic material. If installing on an eroding surface, place a plastic liner prior to deployment to reduce further erosion of the foundation.	Suitably firm foundation free of organic material. If installing on an eroding surface, place a plastic liner prior to deployment to reduce further erosion of the foundation.	n/a	the RS Demountable Flood Barriers require a concrete slab on which the intermediate posts can be installed.	Stable foundation	Stable foundation	Stable foundation
Inspection and Training Requirements	Some training required for connecting the sections and filling in. There are also videos and training presentations for contractors.	Training would be provided by the company.	No inspections required	No inspections required	No inspections required	Training will we supplied upon commissioning.	Training will we supplied upon commissioning.	None	None	None
Storage Requirements	Indoors and away from sources of heat or UV light.	n/a	n/a	n/a	nested storage abilities	Recommended warehouse, container storage	Recommended warehouse, container storage	Store empty bags inside	Store empty bags inside	Could store inside or outside
Shelf Life/Reusability	Long shelf life, but unique based on the exposed conditions. There are patch kits available to fix small damages, where needed, which will help prolong the use of the dams.	5 year manufacturers warranty, a shelf life of 20 years.	'design life' of 5 years even though they can easily be expected to last upwards of 10 years.	'design life' of 5 years even though they can easily be expected to last upwards of 10 years.	The Muscle Wall can be placed outside for a number of years without issue and there is a 10 year warranty against UV damage.	50+ years. To keep your Demountable Flood Barriers long lasting and organized, please see our storage solutions.	50+ years. To keep your Demountable Flood Barriers long lasting and organized, please see our storage solutions.	Bags unlikely reusable	Bags may be reusable	blocks are reusable. Long shelf life
Ability to Withstand Prolonged Contact with Flood Waters	It will be okay as long as the freeboard is maintained and the fluid that is in contact does not have chemicals to damage geosynthetics. Lake water should be fine.	That it was they are designed for. Tiger Dams can be deployed outside for months at a time, all 4 seasons if need be, as they have a UV coating.	n/a	n/a	n/a	n/a	No time limit. We have our systems permanently installed and exposed to harsh weather conditions.	Good, especially if wrapped in plastic	Good, especially if wrapped in plastic	Good, especially if wrapped in plastic
Ability to Withstand Prolonged Wave Action	It should be okay as long as the freeboard is maintained. The design should account for the loading due to the waves.	Tiger Dam is an FM Approved product so we went through rigorous testing with the Army Corps of Engineers and FM Global. Riverine, 1ft 2ft 3ft wave testing and overtopping tests, also seepage tests were down where Tiger Dam received the highest level of Platinum Certification.	n/a	The Defencell product is great to create a long term, reinforced berm, that can take overtopping.	n/a	n/a	n/a	Good, especially if wrapped in plastic	Good, especially if wrapped in plastic	Good, especially if wrapped in plastic
How Could this Option Fail?	Loss of freeboard, failure of the dyke, dyke erosion/settlement causing undercutting, bearing capacity issues, improper installation, vandalism.	Human error	The greatest point of failure would come from water eroding or scouring away the soil they are sitting on. This is easily mitigated against by using a plastic liner as detailed above.	The greatest point of failure would come from water eroding or scouring away the soil they are sitting on. This is easily mitigated against by using a plastic liner as detailed above.	The greatest point of failure would come from water eroding or scouring away the soil they are sitting on. This is easily mitigated against by using a plastic liner as detailed above.	None	Mechanical Failure: mechanical impact by heavy duty truck or similar (can be prevented)	Holes in the plastic wrap or bags, foundation instability	Holes in the plastic wrap or bags, foundation instability	Blocks could crack or fall from foundation instability