Quick Water Abstraction Volume Estimator Version 1.0 July 2018

Introduction

Registration of a water abstraction is required when then maximum daily abstraction is expected to exceed 25 m^3/d and is not required for any abstraction below this amount. This document can be used to estimate abstraction volumes for various sectors where the abstraction volume is not directly monitored. The estimates in this document have been prepared in consultation with the various sectors who abstract water and following review of relevant studies on abstraction volumes.

Where flow meters have been installed at the point of abstraction, data from these meters should be used to give an indication of the maximum daily abstraction rate. Where there is considerable variability in the volume abstracted on a day to day basis, volumes should be measured over a longer time period, such as weekly or monthly, in order to determine the maximum daily abstraction volume over the recorded time period. Where there are significant variations in abstraction volumes associated with seasonal water use requirements, e.g. for seasonal irrigation or where there is a seasonal demand associated with tourism, then the maximum daily volume should be calculated during the period with the highest demand.

Where flow meters have not been installed at the point of abstraction or if flow meter data are not available; estimates of flow can be determined based on the factors outlined below. For some abstractions there will be multiple uses, e.g. potable water for domestic consumption, water for commercial uses, water used for farming activities etc. In these instances, a cumulative total should be generated for all known uses of the abstracted water and this total should be used to determine if registration is required. Similarly, where flow meters do not directly measure the volume abstracted at the point of abstraction e.g. when domestic meters are used at the point of delivery, a factor should be applied to account for distribution network leakage.

In an Irish context, the following sectors are known to have abstractions greater than 25 m^3/d:

1. Agriculture (Livestock);
2. Agriculture (Irrigation);
3. Agriculture (Horticulture);
4. Drinking water supply (Public Supplies);
5. Drinking water supply (Group Water Schemes and large private supplies);
6. Aquaculture;
7. Golf course;
8. Hydropower;
9. Industrial (IPC/IED/Waste licensed);
10. Industrial of commercial (unlicensed));
11. Mining and quarrying;
12. Peat extraction;
13. Horse Racing Courses.

This document can be completed and kept as a record of the estimation of abstraction volumes.

Version 1.0 July 2018 **Estimation of Maximum Daily Water Abstraction** **See footnotes below for detail.**	**Fill in yellow cells in Column B as appropriate** **Calculate volume in litres/day in Column C and m^3/day in Column D**		
Column A	Column B	Column C	Column D
Agriculture[i]	**Fill in Yellow cells**	**Water use sub-totals (litres/day)**	**Water use sub-totals (m^3/day)**
1. Cattle	Number of animals	litres/day	m^3/day
- Dairy - 125 litres / day per animal			
- Growers, Beef Cows, Heifers, Bulls, Beef Store Cattle – 35 litres / day per animal			
- Calves – 20 litres / day per animal			
Total Water use - Cattle			
2. Sheep	Number of animals	litres/day	m^3/day
- Ewes – 5 litres / day per animal			
- Lambs, Adult Sheep – 3.5 litres / day per animal			
- Lambs (< 1 year) – 1.8 litres / day per animal			
Total Water use - Sheep			

3. Pigs	Number of animals	litres/day	m^3/day
- Dry Sows, Gilts, Boars – 6.3 litres / day per animal			
- Maiden Gilts, Barren Sows, Finishing Pigs – 5.8 litres / day per animal			
- Farrowing Sows – 32 litres / day per animal			
- Weaners (<20kg) – 2.1 litres / day per animal			
- Growers (<50 kg) – 4.2 litres / day per animal			
Total Water use - Pigs			
4. Poultry	Number of animals	litres/day	m^3/day
- Pullets – 0.1 litres / day per bird			
- Broilers, Laying Hens, Cocks – 0.2 litres / day per bird			
- Ducks – 1.2 litres / day per bird			
- Turkeys (male) – 0.7 litres / day per bird			
- Turkeys (female) – 0.5 litres / day per bird			
Total Water use - Poultry			
5. Horses	Number of animals	litres/day	m^3/day
- Horses – 45 litres / day per animal			
Total Water use - Horses			
6. Crop Irrigation	Hectares	litres/day	m^3/day
Potatoes, Carrots (Spray Gun) – 254 m^3/ hectare, to soak to a depth of one inch			
Potatoes, Carrots (Spray Boom - approx. half of the water used by spray guns) – 127 m^3/ hectare			
Potatoes, Carrots (Trickle Tape - approx. one fourteenth of the water used by spray guns) – 18 m^3/ hectare			
Cereals (Spray Gun) – 254 m^3/ hectare, to soak to a depth of one inch			
Cereals (Spray Boom - approx. half of the water used by spray guns) – 127 m^3/ hectare, to soak to a depth of one inch			
Cereals (Trickle Tape- approx. one fourteenth of the water used by spray guns) – 18 m^3/ hectare, to soak to a depth of one inch			
Cabbage, Cauliflower, Fruit (Spray Gun) – 127 m^3/ hectare, to soak to a depth of half inch			
Cabbage, Cauliflower, Fruit (Spray Boom - approx. half of the water used by spray guns) – 64 m^3/ hectare			
Cabbage, Cauliflower, Fruit (Trickle Tape - approx. one fourteenth of the water used by spray guns) – 9 m^3/ hectare			
Total Water use - Irrigation			
7. Horticulture	Meters (of table)	litres/day	m^3/day
Table top plants – 8 litres / day for every metre of table watered			
Total Water use - Irrigation			

Total agricultural volume			
Domestic use[ii] (e.g. for Drinking Water)	persons/households	litres/day	m^3/day
Population Served - 0.22 m^3 / day per person supplied			
No. households / connections - 0.6 m^3 / day per household supplied			
	rooms		
Hotel (without swimming pool) - 0.15 m^3 / day per no. hotel rooms			
Hotel (with swimming pool) - 0.5 m^3 / day per no. hotel rooms			
	employees		
Offices - 0.015 m^3 / day per no. employees			
Commercial Business / Small Schemes - 0.035 m^3 / day per no. employees			
Total domestic water volume			
Aquaculture[iii]	Kgs fish produced	litres/day	m^3/day
2. Flow through system - 80 litres / day for each kg fish produced			
3. Recirculation system – 8 litres / day for each kg fish produced			
Total aquacultural volume			
Golf courses[iv]	Volume estimate in m^3/day (20/40/75 m^3 per course or greater if measured)	litres/day	m^3/day
4. 9-hole course Parkland 20m^3/day.			
5. 18-hole course Parkland 40m^3/day.			
6. 18-hole Hotel Resort or Links courses likely to be greater than 75 m^3/day and potentially up to 250 to 300 m^3/day as greens, tees and fairways irrigated (amend based on measurement of volumes or estimates of use relating to area irrigated or other criteria where available, otherwise submit as 75 m^3/d).			
Total golf course volume			
Race courses[v]	Hectares watered	litres/day	m^3/day
7. Most tracks in Ireland (dry summer/hot day) – 50 m^3 / day per hectare watered			
Total race course volume			
Hydropower[vi]	Volume estimate in m^3/day	litres/day	m^3/day
8. State managed hydropower – should have a licence and knowledge of flow			

	kW generated		
9. Small scale hydropower – 50 litres per kW generated			
Total hydropower volume			
Industry[vii]	Tonnes processed	litres/day	m^3/day
10. Meat Processing – 2.5 m^3 / day per tonne of meat processed			
	Volume estimate in m^3/day		
11. Milk Processing - The licensed discharge could be used as a proxy for an abstraction rate			
12. Cooling, Refrigeration or other Process Water – Based on design requirements			
13. Industrial or Commercial Production – based on discharge licence			
14. Bottled Water – Use annual sales figures to generate a daily abstraction volume			
Total industrial volume			
Navigation	Total use in m^3/day	litres/day	m^3/day
15. Waterways Ireland manages licences for abstractions on any waterways under their control			
Total navigational volume			
Mining and Quarrying[viii]	Volume estimate as per licence or understanding (m^3/day)	litres/day	m^3/day
16. Active mines – should have a licence and conceptual understanding of the abstraction			
17. Quarry dewatering – volume should equal the maximum volume discharged, less surface water management where known			
	(number of nozels divided by 10)*number of hours		
18. Quarry dust management – 1 m3/hour per 10 nozzles (where unretrieved). Assumes spraying for 10 minutes of the hour at 100 litres per nozzle per 10 minutes.			
19. Concrete products:	Readymix produced m^3 per day		
(a) Ready mix general and for pre-cast products (wet mixes) 150 litres / m3 wet mix.			
	Number of blocks produced per day		
(b).i Concrete blocks 500 litres/1,000 blocks made			
	Dry mix produced m^3 per day		
(b).ii Concrete dry mixes 70 litres / m^3 dry mix.			
Total mining and quarrying volume			
Land drainage[ix]	m^2 drainage area	litres/day	m^3/day
20.a Bog drainage - 0.04 metres (max. daily rainfall) per m^2 bog area			

	Volume estimate in m^3/day		
20.b Bog drainage - as per discharge licence			
Total bog drainage volume			
		litres/day	**m^3/day**
Maximum daily water volume for this abstraction			

Notes on Abstraction Estimates:	**Abstraction name:**	
	Assessed by:	
	Date:	

Footnotes:

[i] Dairy taken from discussions between DHPLG and DAFM. Other cattle, sheep, pigs, poultry taken from Northern Ireland EA Abstractions Ready Reckoner:

https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-guidance-water-usage-agriculture-ready-reckoner-2013.pdf

The Irish Farm Animal Welfare Advisory Council indicate a range of 20-70 l/d for horses; a mid-point of 45 l/d has been used. Crop Irrigation and Horticulture taken from Northern Ireland EA Abstractions Ready Reckoner, with Cereals proposed from Food and Agriculture Organization of the United Nations (FAO) guidelines.

[ii] Based on data from CER/IW. Hotels utilise EPA Green Hospitality report:

https://www.epa.ie/pubs/reports/green%20business/Resource%20Efficiency%20in%20the%20Green%20Hospitality%20Sector%20-%20Case%20Studies.pdf

and an EU study:

http://ec.europa.eu/environment/water/quantity/pdf/Water%20Performance%20of%20Buildings_Study2009.pdf

undertaken by Cranfield University. Northern Ireland examples cited in:

http://greenbusiness.ie/case-study-cat/greenbusiness/

suggest 0.1 and 0.25 m^3 / day for hotels without and with pools respectively. Offices based on EPA study of its own premises

http://www.epa.ie/pubs/reports/other/corporate/Greening_the_EPA.pdf

Business figures also utilise the study by Cranfield University.

[iii] Derived from product manufacturers study promoting recirculation systems. A cross check against an IFA Aquaculture study seems to suggest this is on the low side, citing figures of 300 litres / day per kg (~12,000 m^3 for each stock):

https://www.ifa.ie/wp-content/uploads/2015/09/Land-based-report-IWH-final-Aug-2015.pdf

Whereas an EU study suggests its higher than the 50 litres / day per kg:

https://circabc.europa.eu/sd/a/6112e063-d8aa-4533-9fbb-2abd47cce769/Presentation%204%20Jesper%20Heldbo%20EU_Baltic_Recirculated%20Aquaculture_JH.pdf

An aquaculture example cited in:

http://greenbusiness.ie/case-study-cat/greenbusiness/

suggests the plant requires 150 m^3 / day water for cleaning alone.

[iv] Estimates in consultation with the Golf Union of Ireland. Water Use per golf hole in hot weather (Green + Tee) estimate to be 1.80m^3 (1,800 litres). The figures for 9-hole and 18-hole parkland courses have been rounded up to include estimates for machine washing. Clubhouse use – showers, toilets, bar, catering etc. have not been included in these estimates.

For 18-hole Hotel Resort or Links courses the water usage may be potentially up to or greater than 250 m^3/day or 300 m^3/day respectively depending on specific circumstances, other water uses (hotel) and area watered. The figure of 75 can be amended if there is water metering, volumes used or improved knowledge of area irrigated.

Greens

1. It is normal for greenkeepers to apply c. 600 litres to a green (c. 500m^2) under average warm summer weather conditions. i.e. Pumping rates 200l/min for 3 minutes.
2. In hot weather the application could be increased to two rounds of watering i.e. 1,200 litres per green (all the irrigation systems on golf courses are computer/electronically controlled – watering is undertaken at night).
3. The greenkeepers visually examine the moisture content. If the rootzone is drying more water will be applied manually.

Tees

1. Tees on most golf courses are irrigated
2. Because the maintenance of a specific grass species is not as critical and wear levels are higher watering rates tend to be higher.
3. Estimated applications of 2l/m^2 during the summer over area per tee c. 300m^2 is 600 litres per tee.

[v] Broadly uses study by Cranfield University, taking account local info and outcome largely in line with Horse Racing Ireland's view. After prolonged dry spells applications of 5 mm / day are not uncommon, which equates to 50 m^3 / day per hectare (which would equate to 500 m^3 / day for a track like Leopardstown, as this has a track area of about 10 ha).

[vi] Taken from online material on how Hydro-schemes work.

[vii] A meat processing example cited in

http://greenbusiness.ie/case-study-cat/greenbusiness/

A second example highlights a pig processor uses > 100 m^3 water / day. Food Safety Authority may require record keeping on volumes produced. The natural mineral waters subset of bottled waters has only two companies recognised in Ireland; Ballygowan, Limerick and Glenpatrick, Tipperary. The website

http://www.finewaters.com/bottled-waters-of-the-world/ireland

has identified/named 15 bottled water companies in Ireland.

[viii] Based on discussions with Irish Concrete Federation's and online industry material.

[ix] Based on BNM comment that the pumping is to address rainfall, using maximum daily rainfall values of 0.04 metres for the midlands (recorded Dec 2015).