

SURFACE WATER ABSTRACTION

MONITORING PLAN GUIDANCE



Purpose of Document

The Northern Ireland Environment Agency (NIEA) monitors and controls abstraction and impoundment of water in Northern Ireland under The Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006.

All operators who have applied for a licence to abstract from surface water under the regulations are required to produce a monitoring plan at least 2 months prior to commencement of the operation. The purpose of this document is to provide guidance to operators who have been granted a licence to abstract surface water on:

- why monitoring of surface water abstractions is required,
- what is required in a monitoring plan, and
- flow monitoring returns required by NIEA.

Why monitoring is required?

NIEA needs information on abstractions to enable it to carry out its duties under the Water Environment (Water Framework Directive) Regulations Northern Ireland 2003 to meet the objectives of the Water Framework Directive (WFD) 2000/60/EC which includes preventing deterioration of, protecting and enhancing the water environment and promoting sustainable water use. In order to meet these objectives environmental flow standards have been developed for surface water abstractions. Information on the flow standards can be found in The Water Framework Directive (Classification, Priority Substances and Shellfish Waters) Regulations (Northern Ireland) 2015. NIEA apply the flow standards to all surface water abstractions to ascertain what proportion of river flows can be abstracted without comprising the objectives of WFD. It is therefore important that volumes of water abstracted are monitored and returned to NIEA so the flow standards can be applied. In addition abstraction volumes are needed to assess water resources within the catchment so that water resource status maps are developed to ensure needs of all current and future water users are met. Finally volumes are needed to inform the licence review process and benefit the abstractor by operating to their maximum potential water usage thus improving on efficiency processes or in some cases even lowering their usage therefore resulting in a reduction in charges.

In the second round of river basin planning cycles (2015-2021) NIEA will target licence reviews and flow monitoring on licensed and deemed proposals not meeting high or good flow standards. In addition to this all new abstraction proposals may require installation of continuous flow monitoring. Information on water bodies not meeting high or good hydrological status can be found by accessing the following website:

<https://apps.d.aera-ni.gov.uk/RiverBasinViewer/>

What is required in a monitoring plan?

The monitoring plan must meet the minimum requirements set out by NIEA, as detailed in this document and will include the details on the location and proposed method of monitoring and recording flows. An example of a monitoring plan template can be found in Appendix A.

All applications should include the following but are not limited to:

- a. Grid references clearly marking the abstraction and return points (if applicable)
- b. Map illustrating location of proposed scheme
- c. For Hydro Electric Power (HEP) schemes the size of the proposed turbine, maximum and minimum turbine design flows, peak design flow
- d. Distance (m) between proposed abstraction and return points
- e. Proposed hands off flow (HoF) and how this will be maintained
- f. Proposed residual flow and details of agreed compensation flow
- g. Details of abstraction regime
- h. Details of proposed control mechanisms for abstraction
- i. Details of existing and proposed flow monitoring including method and frequency of recording
- j. Details of fish screens, fish passes
- k. Details of existing structures both natural and artificial

NIEA is seeking to ensure the cost involved in monitoring of flows will be designed to best fit the normal operations of the proposal, the ecological sensitivity of the abstraction location and the environmental risk. Therefore some proposals may have existing infrastructure already in place to determine volumes and no further infrastructure may be required. In other areas, where water bodies are at risk of not meeting water resource standards new flow monitoring may be required.

Examples of the different flow monitoring scenarios that can occur are illustrated in Appendix B. These include examples for:

- a. simple consumptive abstraction
- b. non-consumptive abstraction
- c. non-consumptive abstraction with numerous return points
- d. Single source impounding reservoir
- e. Multiple source impounding reservoir

Flow monitoring methods

There are a number of methods used to determine flow. These include calculating flows from fixed dimension pipes, from turbine outputs, fixed control structures such as v-notch weirs and flow monitoring in open channels (direct and indirect methods employed). The method used will be determined by a number of factors such as site location, nature of the abstraction/return point and the accuracy of monitoring required. For further information on the suitability of flow monitoring associated with an abstraction proposal please contact the NIEA Hydrology Team at:

Hydrology Team
NIEA
Water Management Unit
17 Antrim Road
Tonagh
Lisburn
BT28 3AL

hydrology@daera-ni.gov.uk

Recording and monitoring returns required

Daily abstraction volumes are required from all licensed abstraction activities and must be recorded and returned to the NIEA Abstraction and Impoundment Licensing (AIL) Team on an annual basis. Abstraction information should be submitted to NIEA by 1st March for the preceding calendar year. An example of a recording sheet can be found in Appendix C. Data Return forms can also be downloaded from the NIEA website at:

<https://www.daera-ni.gov.uk/publications/abstraction-data-return-form>

Where river flow measurements are also required in accordance with the abstraction licence these must be recorded and returned on an annual basis. Where possible, measurements should be completed electronically using a spreadsheet, such as the one in Appendix D. Submission of monitoring data can then easily be emailed to the NIEA AIL Team at ail@daera-ni.gov.uk

Any difficulties complying with the monitoring conditions should be included with the return of measurements. If no measurements have been acquired then the NIEA should be informed using the above e-mail address stating the reasons and the measures that have been implemented to ensure future compliance.

Authorised Officers from the Department shall be allowed to inspect the operation of the scheme at all times. Monitoring records of daily abstraction volumes shall be kept on-site for inspection.

APPENDIX A – Monitoring Plan Template

Monitoring Plan for HEP Abstraction

SECTION A Licence Details

Licence Number	AIL/
Licence Issue Date	
Licence Holder & Name of Authorised Person	
Address	
Name of River	

SECTION B - Summary of All Licensed Activities

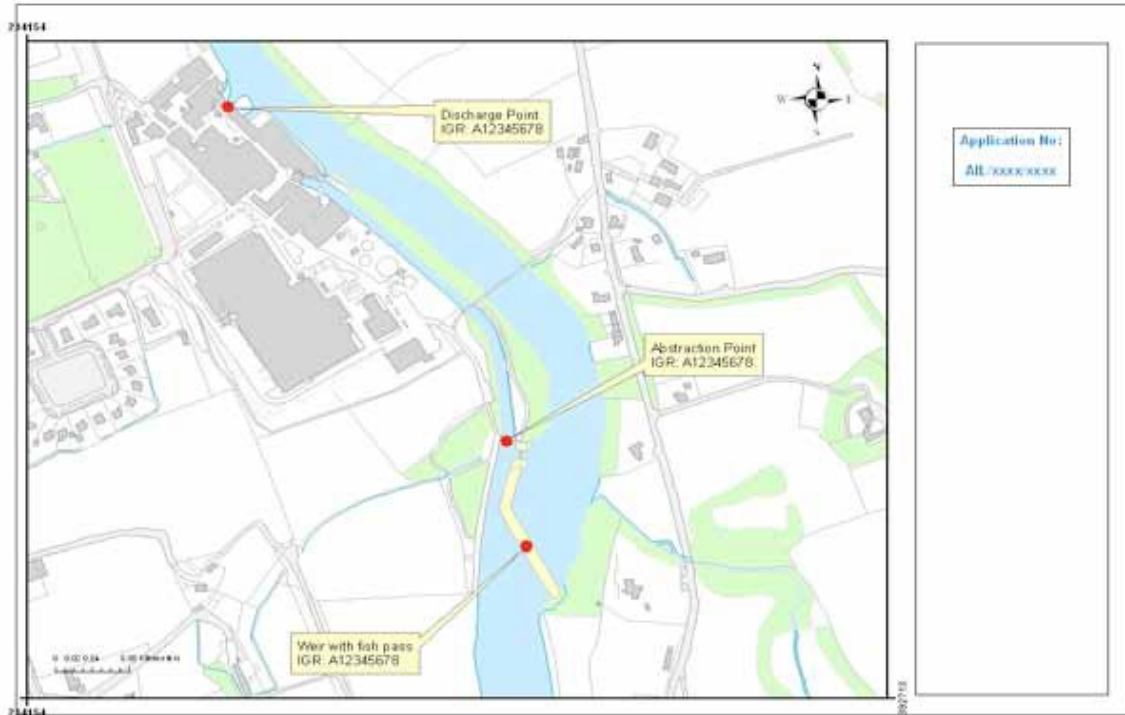
Locations of all licensed abstractions and impoundments with grid references, source type and abstraction method listed in tabular form

Abstraction Description	Location IGR	XY co-ordinates	Source Type	Abstraction
Abstraction into mill race	A12345678	123456, 123456	River	Fixed weir
Impoundment Description	Location IGR	XY co-ordinates	Source Type	Compensation
Small impounding weir	A12345678	123456, 123456	River	Yes – fish pass
Return Description	Location IGR	XY co-ordinates	Distance between	Discharge Flow
Discharge back into river	A12345678	123456, 123456	250	Fixed pipe

SECTION C – Schematic/Site Plan

Submission of a detailed plan showing all the activities including abstractions, impoundments, compensation flows and return points (if applicable). The plan should include all locations of existing and proposed flow monitoring devices. The plan should show the layout of all pipework/ channels and direction of flow. A map can be downloaded for free from the NIEA website found at:

<https://apps.d.aera-ni.gov.uk/RiverBasinViewer/>



SECTION D - Description of Licensed Activities

This section should include more detailed information of all the licensed activities listed.

- Is it a single or multiple source abstraction? If multiple abstractions are present are they all located in the same river catchment or are they located in different river catchments?
- Are there any by-pass channels present?
- Is there a fish pass present or screens? Please provide details including volume of abstraction/compensation flow or discharge in m³/d.
- Details and photos (if possible) of the proposed or existing abstraction/control mechanisms.
- Frequency and variation of abstraction – monthly/seasonal.
- Residual flow m³/d, hands-off flow m³/d.
- Description of structures, dimensions, type (v-notch etc).
- Distance between abstraction and return point (m).
- Existing discharge consent references.
- Results of any river flow studies, including flow duration curves, carried out in conjunction with the scheme.

SECTION E - Flow Monitoring Proposals

This section should outline all existing and proposed monitoring methods that have been identified in the schematic/site plan. At the very least the following points should be included:

- Details of existing flow monitoring methods used to measure river flows and abstracted volumes e.g. continuous flow meter, fixed rate pump, open channel measurements
- Frequency of flow measurements: continuous/ daily

- Details of proposed flow monitoring methods used to measure river flows and abstracted volumes e.g. continuous flow meter, fixed rate pump, open channel measurements
- Details of how proposed hands off flows will be controlled
- Proposed frequency of flow measurements: continuous/ daily
- Timescales of implementing new flow monitoring methods
- If activities cannot have flow monitoring installed reasons should be stated why this is not possible e.g. if there is an alternative to monitoring flows such as turbine output at hydropower schemes

SECTION F-Sediment Management

Sediments are an integral part of the complex system that determines flow character, form and ecology within inland surface waters. In essence, water flow gives rise to sediment erosion, transport and deposition, which are major determinants in ecological establishment. Sediment features and the resulting vegetation in turn affect hydraulic roughness and channel form which feedback to affect flow conditions and other sediment processes. Intervention with this system can be unpredictable, leading to further changes within the surface water body. Fine sediment will gather behind weirs and in-channel structures, often for long distances back, reducing the benthic habitat for invertebrates and fish. Applicants must ensure that the design of any new impounding structure or amendments to an existing structure, prevents sediment deposition behind the weir, allows silt transportation and the movement of woody and organic matter downstream.

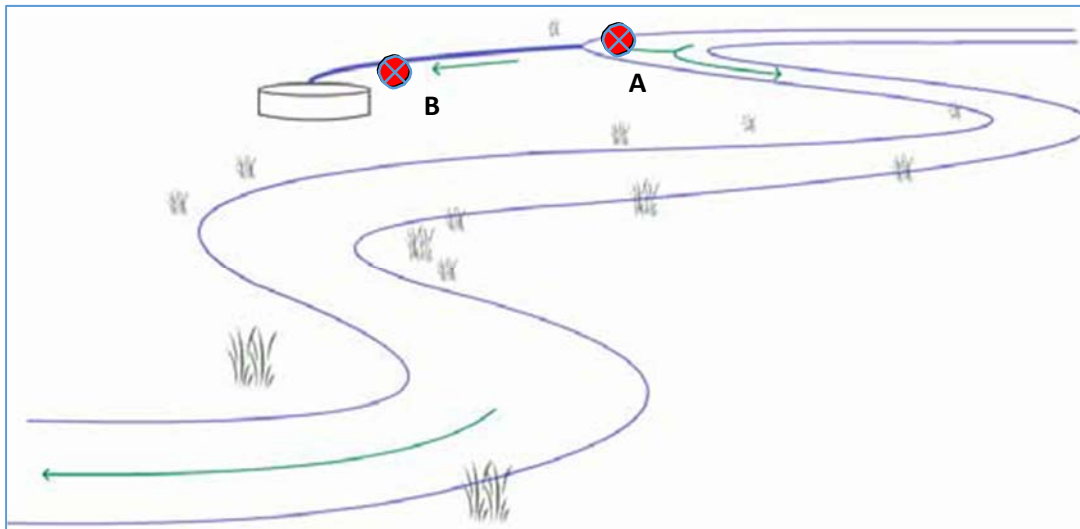
NIEA requires applicants to include a sediment management section within the Management Plan for their installation. Applicants will have to assess the impact their installation is having, or likely to have, on the river and include the appropriate mitigation in their management plan. Mitigation measures will depend on the site and the type of weir and can include:

- Freshets (the release of stored water to simulate natural spate conditions)
- Periodical stoppages of the abstraction to scour sediment build up from behind the impoundment

APPENDIX B Flow Monitoring Scenarios

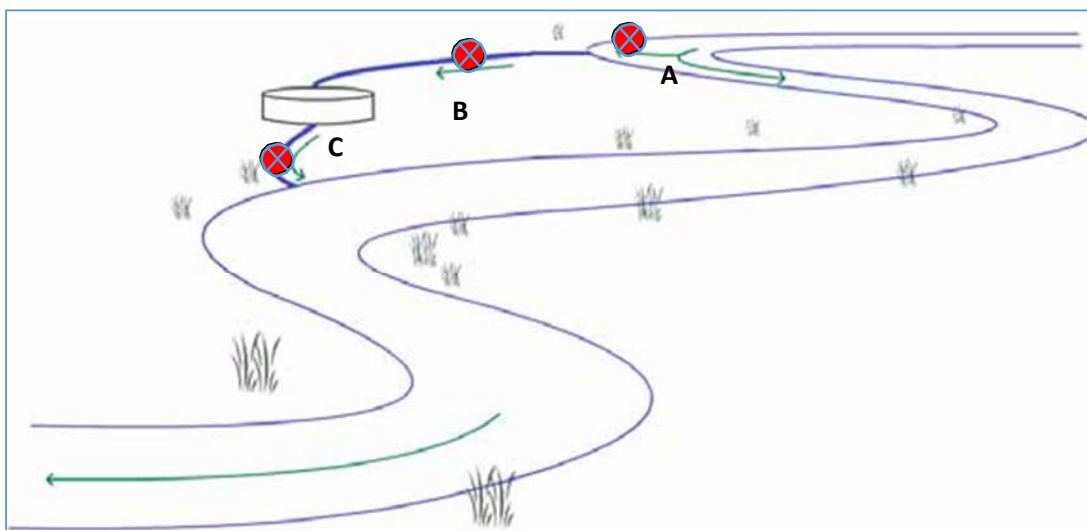
Consumptive Abstraction with Single Point Abstraction

Details of river flow monitoring method at point of abstraction A and volume abstracted B



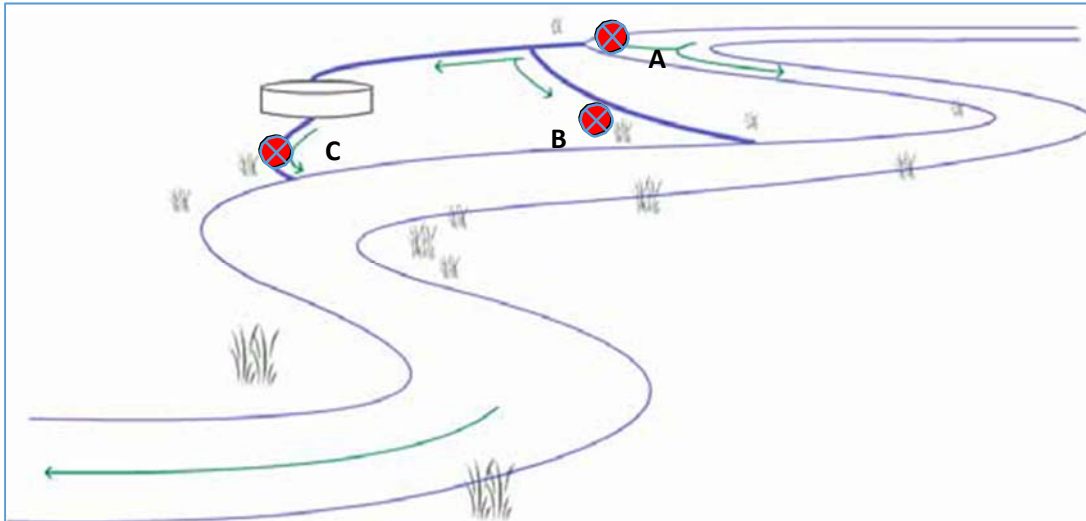
Non-Consumptive Abstraction with Single Return Point

Details of river flow monitoring method at point of abstraction A plus either abstraction volume at intake B or return point C



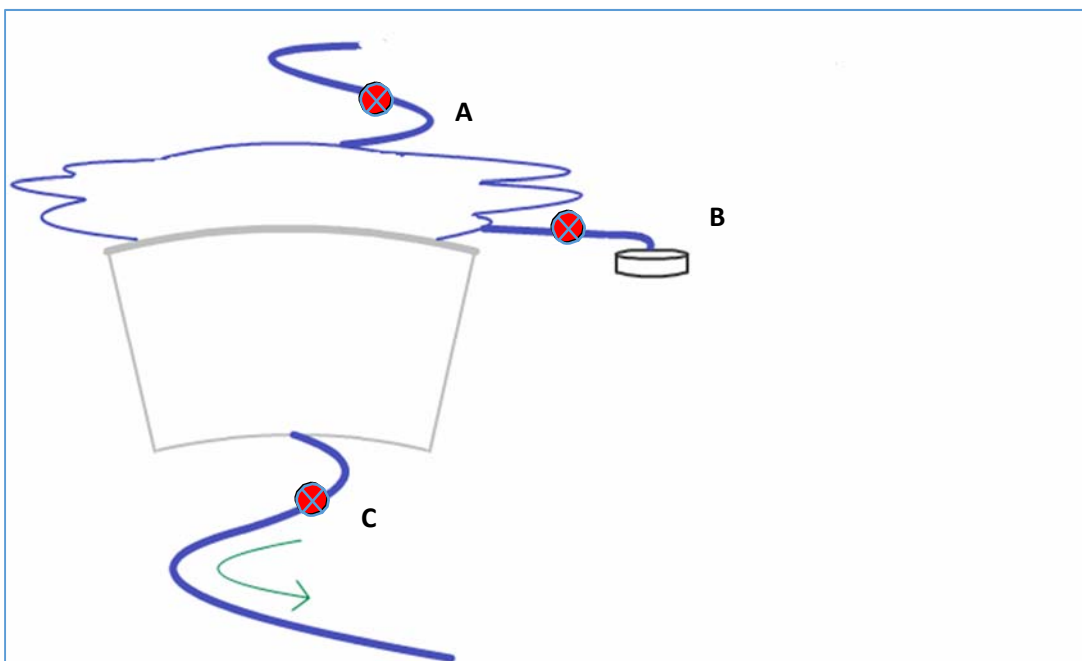
Non-consumptive Abstraction with Multiple Return Points

Details of river flow monitoring method at point of abstraction A and volumes at return points B and C



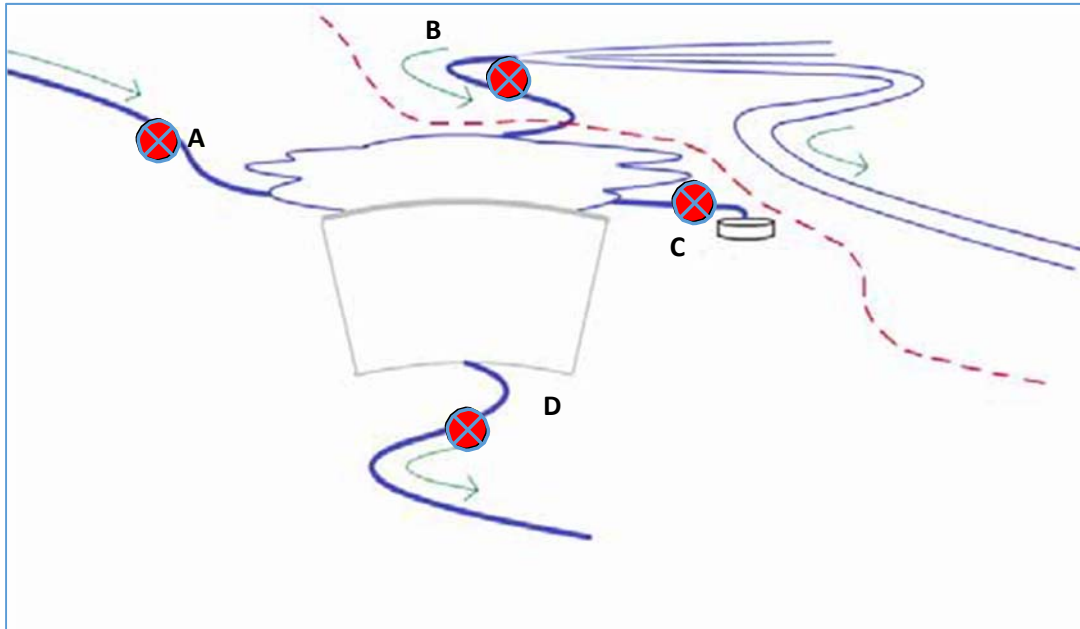
Single Source Water Storage Reservoir

Details of river flow monitoring method at either point of abstraction A or volume abstracted to works B and compensation flow C



Multiple Source Water Storage Reservoir

Details of river flow monitoring method at both points of abstraction A and B plus volume to works C and compensation flow D



Appendix C: Example of Abstraction Volume Returns

Licence No

Year	Grid Ref											
Month	January	February	March	April	May	June	July	August	September	October	November	December
Date												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												

Month	January	February	March	April	May	June	July	August	September	October	November	December
23												
24												
25												
26												
27												
28												
29												
30												
31												
	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL												
ANNUAL TOTAL												

Note current Data Return Forms for Abstraction Licences can be downloaded from the NIEA website at <https://www.daera-ni.gov.uk/publications/abstraction-data-return-form>

Appendix D: Example of Flow Measurement Record

Licence No.		Site Name	
Year		Start Date	End Date

Monitoring Point Location		Grid Ref.	
Flow Measurement Method		Units of measurement	

Month	January	February	March	April	May	June	July	August	September	October	November	December
Date												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												

Month	January	February	March	April	May	June	July	August	September	October	November	December
23												
24												
25												
26												
27												
28												
29												
30												
31												

Note current Data Return Forms for Abstraction Licences can be downloaded from the NIEA website at <https://www.daera-ni.gov.uk/publications/abstraction-data-return-form>