National Federation of Group Water Schemes
Society Limited
24 Old Cross Square, Monaghan H18 NX30
Tel: 047 72766 **Fax:** 047 72788 **Website:** www.nfgws.ie

12 July 2019

NFGWS submission on Draft Climate Change Adaptation Plan: Water Quality and Water Services Infrastructure

The National Federation of Group Water Schemes (NFGWS) very much appreciates the opportunity provided to our organisation to contribute to the discussions around the potential impacts of Climate Change on the water and wastewater services sectors. We also welcome the opportunity provided to us – through this public consultation – to present our views on the draft Adaptation Plan.

What we propose to do is to provide an overview of the draft plan, followed by our observations in relation to the hazards listed in the document. We also append our own assessment of what we feel that water supplies need to be doing at present and in the future to prepare for climate change and the potential areas in which capital resources will be required.

Section 1 - Overview

We feel that the draft needs to be strengthened if it is to be fit for purpose in providing 'strategic direction' for the water services sector and is to 'inform the design, resourcing and review of policies and measures' (p. 28).

As a general comment, we are of the opinion that the draft plan is written from an 'urban' view of water services, with group water schemes and private well owners dealt with in passing, or as an aside. While the Rural Water Programme is referenced as a 'key current driver for adaptive measures', there is no reference to the Quality Assurance Implementation Guidance completed by the NFGWS (which addresses all of the hazards referred to in this plan and more). Nor is there reference to the NFGWS Source Protection Strategy which is at an advanced stage of implementation. Our Strategic Plan 2019-2024 specifically addresses climate change readiness. We also have a developed strategy (and completed template) on community-led management of individual wastewater systems (septic tanks). We have a step-by-step guide to incident response planning for group water schemes and a highly successful education/water awareness programme. Yet, these are not mentioned either. By contrast, Irish Water's 'National Water Resources Plan' is referenced, even though it is not currently available. We are happy to share the wealth of experience in the rural water sector, as this will assist in the development of sensible, workable and effective climate change readiness across the entire water and wastewater sectors. This experience isn't currently reflected in the plan and we strongly believe that it should be.

We also feel that the draft plan is lacking in conviction and is overly cautious: the words 'could' and 'may' are repeatedly used where 'should' and 'will' are required. For example, with reference to the potential impact of rising temperatures, we are advised that high temperatures 'may' lead to increased water demand. There is no 'may' about it; high temperatures invariably lead to increased demand. On this point, the report focuses largely on 'household' demand rising, but in our experience the bulk of the increased demand will be on the non-domestic side and particularly in agricultural use, largely because livestock require much more water when heat rises. While reference is made to animals drinking from sources when temperatures rise, the increased reliance on potable water is not mentioned. The proven relationship between temperature and agricultural demand should surely be a key focus of the plan and should inform a strategy to actively encourage and support rainwater harvesting on farms to supplement potable supplies during periods of high temperatures and periods of drought. Moreover, increased domestic demand (and business demand) should prompt consideration of changes to the planning process that require the installation of rainwater harvesting/greywater reuse systems as part of planning requirements on new builds, thereby reducing pressure on potable supplies from these sectors. As a measure of its commitment to encouraging the adoption of rainwater harvesting/grey water re-use, the NFGWS is considering a strategy where schemes would reduce new connection fees by a third as an incentive to the installation of accredited potable water displacement systems and low flow plumbing fittings.

As another example of the overly-cautious approach that is evident throughout the draft plan, on page 34 we are told that lower precipitation 'could' lead to reduced flow in rivers … etc. Again, there is no 'could' about it; low precipitation inevitably leads to reduced flow in rivers etc. In a reference to reducing demand during periods of low precipitation, page 54 asserts that the measures required 'will depend on the existing water stress and on consumer **expectations**' [our emphasis]. In our view, consumer expectations cannot be allowed to influence the adoption of measures that are necessary to ensure the maintenance of a potable supply for essential use. The plan needs to be assertive and brave.

As a final general observation, the plan is (in parts) written in language that is not accessible. For example, on page 54 we read as follows: 'Option analysis can be supported through various modelling approaches, involving the strategic assessment of the impact of climate change on water resources availability and system modelling approaches to understand asset exposure and how drought and climate change scenarios impact wide Deployable Output, and hence the impact on consumers.' On the same page, we read 'Outcomes can be further improved when any option taken forward forms part of an integrated catchment management approach (which is in line with the provisions of the WFD and RBMP)'. The final plan needs to be written in a style that avoids jargon, has short sentences and makes sense.

Reducing water demand

Any revisit of this draft plan has to take account of the simple fact that Ireland is currently abstracting, treating, distributing and disposing of far more water than is required. This reality and its environmental and cost implications needs to inform our strategic direction if we are to build resilience in the drinking water and wastewater sectors. The plan, where it does reference the issue of 'water demand' is non-commital, at best. Several of the 'options' presented on page 46 are necessities and should be referred to as such. Reducing water demand (by addressing water loss [UFW] and water wastage) to levels being achieved in other European countries has to be an overarching priority. Any success achieved in this regard will have immediate relevance to climate change in terms of reduced energy use, reduced chemical use in water treatment, reduced desludging and reduced pressure on infrastructure. Where water treatment processes are operating well within their design capacity, they are much more effective and they have greater capacity to deal with any deterioration in water quality that may arise from extreme weather events.

To address excessive water demand, the first step is to assess legitimate demand. This is a desktop study that requires no capital outlay. Once a water supplier knows how much water they should be supplying, it is easy to calculate the level of excess demand. From the experience of the rural water sector (which has already largely completed its capital programme), investment will be required in distribution networks to allow effective monitoring of flows and to guard against pressure fluctuations and leakage. Thus, bulk meters and sluice valves (and, where necessary, pressure reducing valves) are required tools, as is universal metering of connections. Replacement of critical mains will also be required, but this needs to be informed by water audits to be completed once the necessary valves and meters are in place. Within the GWS sector, the emphasis now is on another vital stage of network management; the mapping of assets and preparation of an asset replacement schedule.

The plan needs to state that there be a level of charging on excessive water use that acts as a deterrent and encourages conservation. In our view, it is counter-intuitive to have a reduced charge where larger volumes of water are consumed. The value of infrastructural investment, as outlined above, combined with charging for excessive use is attested to by the fact that UFW in the GWS sector is significantly lower on than on public supplies, even though group water schemes have substantially longer networks relative to population density.

Audits of water supplies

The plan also needs to recognise that the potential impact of climate change will vary greatly from one supplier to the next. Adopting a risk-based approach will mean that resources can be targeted to those supplies that most need them. Therefore, assessing the current level of risk on each supply should be an immediate priority. There is a single mention of the Drinking Water Incident Response Plan (DWIRP) in the draft plan Section 3, but it would be a mistake to undervalue those DWIRPs that have been completed. They would at least provide a starting point in evaluating schemes, even if they would need to be broadened to include climate change weather events as 'incidents'. In addition, catchment to tap audits are currently being completed by local authorities on group water scheme supplies, while audits of public water supplies are part of the EPA's role. Data from such audits might easily be expanded to provide an informed assessment of climate change readiness on every water supply.

The responsiveness of supplies to extreme weather events can be speedily determined. Drinking water quality analysis completed over decades by the EPA, as well as analysis by DBO service providers, by individual schemes, by local authorities and, more recently as part of monitoring under the Water Framework Directive, will demonstrate variability (if any) in key indicator parameters including conductivity, pH and turbidity. From this data, a reasonable assumption can be made that all surface water supplies will be impacted (in the case of the GWS sector, this accounts for 78 supplies). It can also be assumed that groundwater sources influenced by surface water flow (such as springs in karst areas and shallow wells) will also be impacted by climate events. Deeper, well constructed boreholes, on the other hand may or may not show variability in raw water quality. There are 94 GWS drinking water supplies on spring sources and 188 on borehole sources. Some have more than one raw water source, while others have mixed source types.

In the case of some surface waters and most groundwaters, there is likely to be a time lag between weather events and impacts. For one Roscommon GWS supply, for example, the contamination occurs up to 9 days after heavy rainfall. Impacts can be most severe in the early days of weather events, but can then settle despite the continuation of the storm event. This information is key to understanding how sources are likely to respond to future weather events.

For the above reasons, updated audits should be finalised on all drinking water supplies, based partly on existing audits and the data referred to above. However, for audits to accurately reflect the capacity of schemes to cope with climate change, real time monitoring data will need to be gathered in advance. A year-long programme of raw water monitoring at the intake to treatment plants linked to weather monitoring is needed to accurately determine source variability. We do not believe that the 'regular' monitoring referred to in the draft plan will effectively capture the information required. Further, it should be noted that under the recast Drinking Water Directive, turbidity monitoring is likely to be a requirement for water suppliers, so consideration should be given to moving forward with this investment on those supplies that don't already have monitors and weather stations installed. UV absorbance monitoring of raw water on schemes at risk of THM formation should also be considered. This technology has already been successfully implemented on Leitir Mealláin GWS [see page 14 *Rural Water News*, Autumn 2013]. In terms of judging the responsiveness of groundwater sources to extreme weather events, the recent initiative taken by Tipperary County Council to place loggers in GWS borehole supplies should be replicated on all borehole schemes, as this will provide essential information on aquifer depletion during dry weather and the time lag for recovery to occur after precipitation. Similarly, loggers on the outflow from springs would be an important contribution to better understanding how they respond to extreme weather events.

Wind, low temperatures, snow and ice

While the infrastructural impacts of windy weather are addressed, it is important to include the influence of wind on lake sources, particularly on shallow eutrophic lakes. As the bed of the lake is disturbed, sediments are resuspended, which causes phosphorus to be released back into the water column. This occurrence is likely to keep lakes in a eutrophic state for many years, even after catchment wide source protection measures have been implemented. Strong winds are, therefore, a significant problem for surface water schemes. In terms of precipitation and storminess, there is no reference to the impacts of extremely cold weather, snow and ice. As the winters of 2009 and 2010 demonstrated, these have a major disruptive effect on water supplies. Water demand increases as consumers leave taps running and, as a consequence, there may be reduced water pressure (or no water) for homes and businesses in more elevated areas. Leakage is more common, arising partly from the fact that pipe services on the network or after consumer connections are not buried deeply enough. Meters burst where frost bungs are not in place and fittings on items such as drinking water troughs may also burst. There is also the issue of reduced access to the source, abstraction points, treatment plants, storage reservoirs and to burst pipework. Being prepared to meet the challenges of severe winter weather should, therefore, be considered as part of the plan. [see the NFGWS 'winter ready' document].

Energy consumption

Most costs in water supplies arise from the use of electricity to pump water from the source to the treatment plant, the operation of treatment processes and, from there, pumping to a storage reservoir or directly to consumers. Besides the expense involved, energy use constitutes the single greatest contribution of the sector to CO2 emissions. As part of Climate Change preparations, positive consideration needs to be given to the completion of energy audits on all supplies and the identification and replacement of inefficient pumping systems. Beyond that, installation of alternative, zero carbon or carbon neutral energy generating systems on water supplies should be considered. Solar power systems have already been trialed elsewhere (e.g. the NI Water plant at Lough Neagh) and have resulted in significant savings. More recently, the installation of a low-cost, in-line generator (PAT) on Blackstairs GWS provides a model for other surface water supplies [see page 14 *Rural Water News*, Summer 2019]. The generator replaces a PRV, reducing pressure while also using the excess energy to generate electricity. At present, such systems can only be installed close to a treatment plant or other potential user, but the planned extension of the energy grid to receive power from micro generation is likely to provide a major incentive to drinking water suppliers to invest in this area.

Comments on specific points contained within Section 3 of the draft plan

3.1 Water Quality

Increased surface and sewer flooding leading to mobilisation of pollutants

Climate Stimulus: High precipitation

Routine monitoring (as proposed) may miss the impact of weather events. The NFGWS would propose the installation of continuous monitoring on raw water intakes as outlined above. The data provided will inform the prioritisation of schemes (for investment purposes) and will inform the measures to be adopted in relation to integrated catchment management and treatment process adjustments, if required.

For schemes that demonstrate weather event variability, continuous monitors at the intake should trigger automated shut-off or a response at the filtration stage, up to and including coagulant dosing levels. In addition, backwash systems on such supplies should be pressure based rather than time based to deal with variations.

In terms of the other measures listed, we would suggest the diversion of road/field drainage systems away from streams and rivers that are part of a source catchment.

Reduced dilution of contaminants

Climate Stimulus: Low Precipitation

There is mention of lakes/reservoirs, but no reference to springs and boreholes, even though low precipitation will impact on these sources also. [A definition of the term 'reservoir' would be useful. Is this a reference to large water storage tanks (as the term if commonly used in Ireland), or does it refer to surface water bodies such as the Blessington lakes from which Irish Water draws a supply?]

Low precipitation, leading to drought in 2018, led to problems with pumping regimes on boreholes as the water table dropped. As the pumps worked harder, they oxidised dissolved iron and manganese.

A problem also arose with concentrated nitrate drawdown, as there was an absence of dilution.

Drinking water demand is a key consideration during periods of low precipitation and drought. As stated in our general overview, excessive water demand during periods of low precipitation and drought will impact on raw water quality, but also on treated water quality where the design capacity of the treatment facility is exceeded. Reducing excessive usage as part of water demand management must be a key consideration for every drinking water now and in the future.

Pressure variations introduced into pipe networks as a water saving measure (e.g. night-time pressure reduction) can result in increased leakage and also increases the risk of back-siphoning contaminants into the network. In Britain, it has been estimated that 20% of water quality incidents in the network arise as a result of back-siphoning).

Changes in species distribution and phenology

Climate Stimulus: High temperature

Invasive species are the only focus of this section, but there is no reference to algal blooms – which are directly impacted by high temperature and which impact on species and on water quality. For example, as temperatures rise through climate change, extended periods of lake stratification can occur. This can result in the lower layer of water in the lake (i.e. hypolimnion) becoming anoxic, which can cause a substantial concentration of phosphorus to be released from the sediment. This phenomenon can complicate lake recovery, even if source protection initiatives are introduced to tackle nutrient enrichment of lake sources.

Drying of peatland

Climate Stimulus: High temperature

We accept that the drying of peatland increases the risk of dissolved organic carbon being released and THMs being formed. Consideration also needs to be given to the impact of drying of agricultural lands on ecological systems and on water supply. The effects of last year's drought was felt for months after as autumn rainfall was largely absorbed by arid land and was not getting into the aquifer.

Increased run-off of bogland leads to increased treatment costs. In the case of one Co. Monaghan supply an additional €40,000 desludging cost was imposed on the GWS over a three-month period following peat harvesting close to their source. This scheme finds that there is least loss when the bog is saturated, but as the bog dries out the cost of desludging increases.

Spread of/increased viability of pathogens

Climate Stimulus: High temperature

One factor that has not been addressed is the increased risk from chlorate formation in stocks of sodium hypochlorite as a result of high temperatures. Besides reducing the efficiency of the disinfectant, chlorates are being added as a parameter in the recast Drinking water Directive, so compliance will be required on all water supplies. Should water supplies be considering the installation of cooling systems in treatment facilities?

Growth of pathogens as a consequence of high temperatures isn't an issue if you have a disinfection residual in the network. If water demand increases, as it does during high temperatures, plants treating beyond their design demand are most at risk of pathogen formation in the network as filtration systems may not have succeeded in removing organics from the raw water.

3.2 Water Services Infrastructure

Climate Stimulus: High temperature

As stated in our overview, the main increase in demand was seen on agricultural supplies. These were also the connections with the highest rates of UFW (leaking drinking troughs etc.).

High temperatures do lead to an increase in water demand.

Please refer to our general overview for the measures we feel are appropriate to addressing excessive water demand.

More frequent water/wastewater asset flooding, asset loss and potential for environmental pollution

High precipitation

Snow and ice, both of which have a major impact in limiting access to facilities and on water loss.

The inundation of wastewater treatment systems and on-site slurry systems during flooding events must be considered as part of the wider planning process. Where existing homes and businesses are located in designated flood plains, a short-term answer would be to ensure desludging/emptying, particularly when heavy and prolonged rainfall is predicted.

Automated continuous monitoring equipment should be linked to water treatment processes. In other words, when there is a deterioration in water quality, the monitor triggers an automated response at treatment level.

Water services infrastructure: Increased drawdown in the autumn/winter for flood capacity, leading to resource issues in the following spring/summer

Climate Stimulus: High precipitation

States the need to upgrade storage facilities to accommodate high rainfall levels, but no mention of excess water demand or conservation. The two should go together.

GWS abstract from approx. 395 different raw water supplies.

More frequent water/wastewater asset flooding, asset loss and potential for environmental pollution

Climate Stimulus: Increased storminess

The negative impact of windy conditions on surface water sources, also needs to be considered (as stated above), in addition to the damage that can be done to infrastructure.

While larger schemes may benefit from having back-up generators to address power outages, this would not be practical for small schemes. However, schemes with direct pump systems need to have alternate power supplies organised as part of their DWIRP and their pumphouse needs to have an appropriate fitting into which a hired generator can be plugged. Such fittings are already installed on many small schemes in Tipperary and Kilkenny.

Business continuity impacts/interruptions

Climate Stimulus: Increased storminess/High precipitation/High temperatures

DWIRP needs to be accorded more prominence in this section and throughout the plan as a whole.

1. *Evaluation of raw water change and its drivers*: As a starting point, an evaluation needs to be completed on all sources to determine whether or not they experience variability in raw water quality as a result of extreme weather events and the time lapse between such weather events and raw water deterioration. This evaluation will include an analysis of historical water monitoring data. Where there is little or no variability in the quality or quantity of a supply (such as a deep, well-protected borehole), the focus needs to be on an audit of water demand/water conservation, source protection measures, the adequacy of treatment processes and energy use (including pump efficiency. For supply sources that show historic variability, either in the quality or quantity of raw water, further analysis is required, to include:

    a. positioning of a computer-linked weather station close to the source abstraction point as possible.

    b. positioning of a continuous raw water monitor at the intake to record variability in pH, conductivity, turbidity and (in the case of schemes at risk of THM exceedances) UV absorbancy (to alert of high levels of dissolved organic carbon)

    c. positioning of loggers in boreholes and the outflow from springs to record how quickly the water table drops in dry, hot conditions and how quickly it recovers following precipitation.

    d. visual monitoring and recording of algal blooms on lake sources to determine their relationship to weather conditions.

    e. finding out if the deterioration plateaus after a period and if so, how long does it take to reach this plateau? Many supplies will find that the major deterioration occurs in the first few days (especially after a dry spell) as detritus is washed off lands/roads into supplies and that after this there is no further disimprovement. However, where unstable river/stream/lake banks collapse after days of very heavy rain, or where the bed of a lake or algal blooms are stirred up, there might well be further deterioration.

2. *Evaluation and reduction of water demand*: If your scheme has not already completed an audit of water demand, this should be immediately prioritised as any reduction will be beneficial in terms of reduced energy demand, reduced abstraction and reduced pressure on treatment processes. The evaluation and reduction of water demand will involve:

    a. establishing the legitimate demand on your scheme (i.e. what should you be pumping daily assuming that there are no leaks or wastage. A calculator to facilitate this desk study is available on the NFGWS website. Note: Allowance should be made for identified high end users, such as a factory or large agricultural enterprise, for which actual usage figures should be recorded as part of your calculations.

    b. Having established 'legitimate demand', your scheme should compare this figure to actual demand. Where high water loss/usage is evident, schemes that do not have the tools to control flow need to prioritise:

i. positioning of bulk meters (at least one into every zone of the water supply). These should be telemetric, where possible.

ii. positioning of sluice valves at the head of each branch of the network, at least.

iii. identification of known consumer connections and installation of a meter.

iv. fixing of marker posts at every metered connection and valve.

v. mapping of the record (digital and hard copy) and preparation of a servicing/replacement schedule.

c. Schemes with excessive water demand and that have the tools to manage flows may decide to retain the services of a specialist company/consultancy (especially if an extensive network is involved). Schemes that would like to complete the audit in-house should proceed as follows:

i. check the bulk meters to establish if there are zones with unusually high flow/night-time usage.

ii. check individual meters on these sections of mains to establish if the problem is on the network or is on the consumer side of connections.

iii. to reduce excessive demand on the consumer's side:

1. inform the consumer and offer advice/assistance to resolve the issue.

2. introduce a usage-based charging system for excessive use.

3. follow the Society rules where a consumer refuses to co-operate, only disconnecting as a final recourse.

iv. to reduce excessive demand on distribution mains:

1. try to locate visible leaks and repair those identified.

2. where leaks are not visible, employ a competent individual company to locate leaks using specialised equipment (such as a sounding stick).

3. where repair of a leak results in further leakage (due to pressure increase), or where multiple leaks are identified, mains replacement may be the best option.

4. while your scheme may have capital reserves to fund the replacement of short sections of watermain, larger projects will possibly require support under the Rural Water Programme. To this end, a qualified professional will have to be retained to prepare an application for funding.

5. aim for zero UFW.

6. consider providing an incentive to the installation of rainwater-harvesting /greywater re-use systems and low-flow plumbing systems on new-build properties within your scheme by offering a reduced new connections fee for approved works.

7. encourage non-domestic consumers (including farmers) to take up schemes offering financial support towards rainwater harvesting systems.

d. In the event that raw water quantity is likely to be an issue during prolonged drought conditions despite the implementation of the measures outlined above, a water supply has three options:

   i. to develop a supplementary/back-up raw water source.

   ii. to connect to a neighbouring treated water supply that has spare capacity, installing a valve that can be opened during periods of shortage.

   iii. to connect to a neighbouring supply that has spare capacity as the first step in full amalgamation.

3. *Development and implementation of a source protection plan:* The catchment/ZOC map and report already completed for your source/s, will provide a sound basis to implement measures that will limit/reduce the impact of future climate events by slowing the flow of contaminants during storm events and, where possible, preventing them entering sources. Your scheme should:

   a. implement (if it hasn't already done so) the recommendations contained your ZOC delineation/catchment report.

   b. liaise with the NFGWS development officer who has special responsibility for source protection and who will provide initial advice and pointers. He can be contacted at patrick@nfgws.ie.

   c. prepare, with a qualified professional, a schedule of upgrading work at the abstraction point (where required) to secure the source from contamination that is easily avoidable.

   d. follow the procedures outlined by the NFGWS in its framework document for source protection planning, as this provides a step-by-step guide [a more detailed plan template will shortly be forthcoming based on learnings from the NFGWS-led Stranooden and Roscommon Source Protection Pilot Projects].

   e. In the event that raw water quality is likely to deteriorate beyond the capacity of existing treatment processes (e.g. nitrate levels rising during prolonged drought conditions on a scheme that doesn't have nitrate removal treatment) despite the implementation of source protection measures, a water supply has three options:

      i. Install the required additional treatment, (but only if your scheme can afford it and can manage it).

      ii. Develop a supplementary/back-up raw water source in which the problematic parameter is not an issue and for which existing treatment processes are adequate.

      iii. Connect to a neighbouring treated water supply that has spare capacity, as the first step in full amalgamation.

      The most cost-effective and sustainable of these options should always be the preferred option.

4. *Ensuring adequacy of treatment processes:* Establishing the efficiency of filtration and disinfection systems is extremely important, but this can only be properly understood when the plant is operating within its design capacity. Where it is not doing so, existing risks – inadequate filtration of organic matter, carry-over of coagulants into the distribution network and difficulty in maintaining a disinfection residual – are bound to be exacerbated with climate change. The initial focus for such schemes has to be in eliminating excessive usage and aiming for zero water loss, as outlined above. Where schemes are operating within their design capacity:

    a. install a shut-off valve at the intake so that excessively turbid water is automatically diverted to waste.

    b. link automated turbidity monitoring systems at the intake to filtration systems (including the coagulation process in DAF facilities), so that the level of treatment is instantaneously adjusted to water quality in real time.

    c. install pressure gauges at the inflow and outflow of each filter to verify efficiency and ensure that backwashing is pressure-related rather than time-related.

    d. install turbidity monitors after each filter to assess their performance.

    e. install validated UV units and necessary monitoring equipment to ensure that UVT and UVI levels are within the certified range.

    f. install duty and stand-by chlorination pumps, with alarms.

    g. consult the NFGWS guidance on chlorination and, where technical problems arise, secure suitable technical support and guidance.

5. *Auditing energy demand, pumping system efficiency, ensuring back-up energy systems and reducing CO2 emissions:* There are easy wins for schemes and for Climate Change in reducing current energy demand and implementing measures that better secure supply during extreme weather events and replace the dependence of energy derived from fossil fuels. This will involve:

    a. complete an audit of energy demand to establish where savings might be made (a professional may be retained for this purpose).

    b. check the efficiency of pumps and service or replace those that are inefficient. Ensure than annual servicing is completed on all pumps.

    c. larger schemes (especially in DBO contracts) may consider installing back-up generators to address power outages. Ensure that these are utilised occasionally (i.e. once monthly) so that you know they will work when required.

    d. small schemes should ensure that their pumphouse/treatment plant is fitted with a properly sized electrical point to which a hired generator can be fitted

As a general point, schemes should develop and implement the NFGWS Quality Assurance System, so that identified protection measures from source to tap can be checked and verified on a regular basis.