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Annex C: Additional detail on specific elements of reform

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1. Introduction

The purpose of this technical annex is to provide additional detail and background on the reform proposals introduced in chapters 4 and 5 of the consultation document. This detail is not required for an understanding of the key reform proposals, but will be of interest to readers who would like to know more about how reform might work in practice. This Annex should be read alongside the consultation document. The areas covered are:

- **Background on water abstraction**
- **Converting seasonal licences**
- **Linking abstraction to water availability**
- **Improving the measurement of discharges**
- **Facilitating trading**
- **Operating existing local arrangements for water resources management**
- **Moving to a new system**

We have not asked any formal consultation questions on the material in this Annex, but if you do have comments to make, you are welcome to provide them alongside your response to the consultation questions.

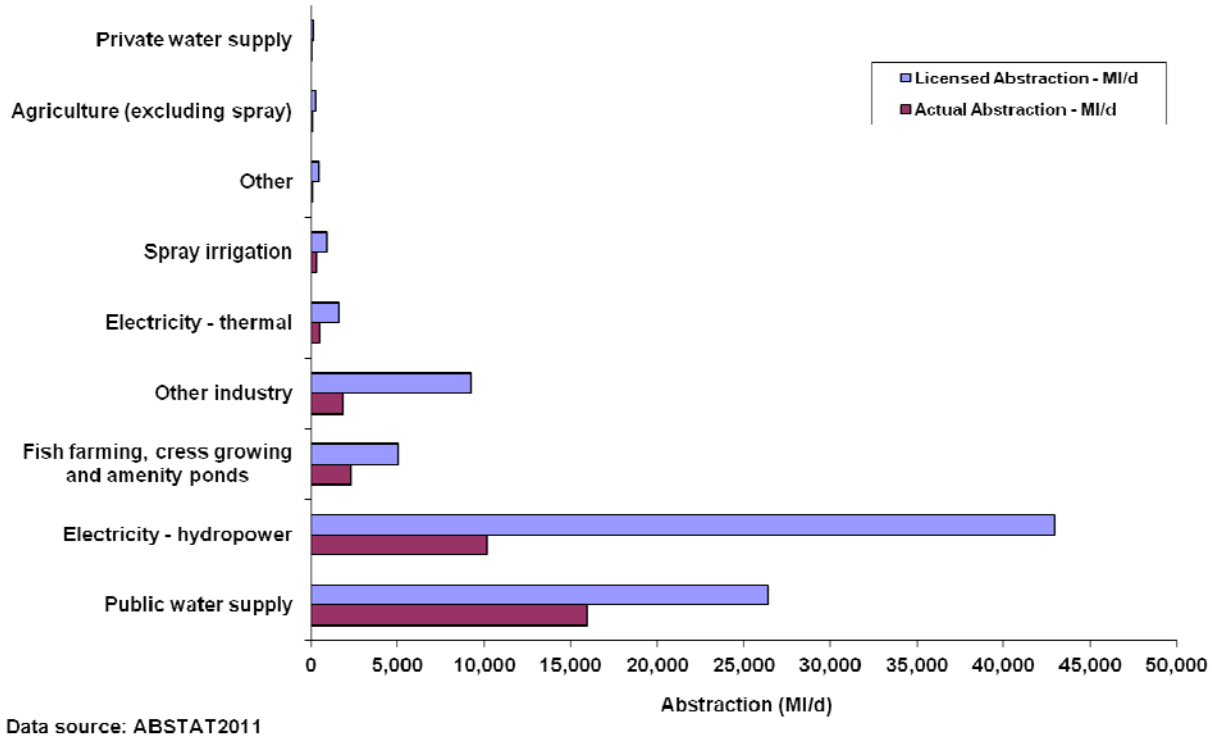
Further detail is available in the abstraction reform consultation impact assessment (Annex A to the consultation) and in the key sources of evidence supporting the consultation document and impact assessment.[1]

2. Background on water abstraction

Overall, there are currently around 20,000 abstraction licences, of which around 1,100 are in Wales. Examples of abstractors include farmers who use water for irrigating crops, manufacturers and industry who use water for processing products and power generating companies who use water for cooling. Reliable access to water supports economic growth and investment in these areas.

[1] See Defra, 2013, Main Sources of Evidence

Figure A1 shows how much water is currently licensed to and used by different sectors.



Data source: ABSTAT2011

3. Converting seasonal licences

3.1 Surface water

To ensure that abstractors can make better use of high flows in response to weather and that the environment is protected, we propose to replace all seasonal surface water licences with abstraction permissions linked to water availability.

Current System Plus

Under the Current System Plus, a surface water abstractor who previously had a winter only licence would have this licence converted so they would be able to abstract water at any time of the year as long as flows are above a set threshold. They would still have an annual abstraction limit.

A surface water abstractor who previously had a summer only licence would have this licence converted so they would be able to abstract water at any time of the year as long as flows are above a threshold equivalent to their current condition. They would also maintain an annual abstraction limit and a daily maximum limit.

Water Shares

Under the Water Shares option, an abstractor who previously had a winter only licence would receive shares that allow abstraction at high flows (see text on reliability groups below). In practice this means that the shares would allow them to abstract at any time of year provided that flows are above a threshold. This threshold would be equivalent to what would apply in the Current System Plus.

An abstractor who previously had a summer only licence would receive shares that allowed them to abstract at any time of year. Their shares would offer similar access to water to what they would get under the Current System Plus option. In addition to shares that define a periodic abstraction limit, probably fortnightly, there would also be a daily abstraction limit.

3.2 Groundwater

Licences that allow abstraction from groundwater at certain times of the year would generally have the seasonal restrictions removed. Environment Agency or Natural Resources Wales groundwater experts would determine appropriate conditions for groundwater abstraction that take account of local risks. This approach is consistent across the Current System Plus and Water Shares options.

4. Linking abstraction to water availability

The Environment Agency and Natural Resources Wales use information from monitoring networks to assess the water and ecological situation. A water balance is calculated for each catchment. The elements of the water balance calculation are river flows, groundwater recharge, abstractions, discharges, and a resource allocation for the environment and any other water uses or features that require protection[2]. Whilst the methodologies for assessing resources are likely to evolve and improve over time, the general principles of the approach to assessing water availability are likely to continue in a reformed system.[3]

For both options, the proposals to improve the link between abstraction and water availability would be focused on catchments where there are clear environmental and economic benefits (enhanced catchments). This means that abstractors in catchments where more water is available and where there is little demand for trading would see substantially less change compared to abstractors in catchments where less water is available and there is demand for trading. For example, allowing

[2] Managing Water Abstraction, Environment Agency, May 2013
[3] See Managing Abstraction and the Water Environment, December 2013

additional abstraction at high flows and additional flexibility around hands off flows would only be introduced in enhanced catchments.

As licences are converted for use in the new system, existing constraints on abstraction would be taken into account. Abstractors who do not have seasonal or flow constraints under the current system are likely to have the highest reliability after reform and those who have more stringent conditions currently are likely to have the lowest reliability in the future.

4.1 Surface water

Current System Plus

The Current System Plus sets out to improve the regulatory tools already used in the current system. The three main elements that link abstraction to water availability are introduced in section 4.2 of the consultation document. These are described in more detail below.

Allowing additional abstraction at very high flows (enhanced catchments only)

Under the Current System Plus each abstractor would have a daily maximum abstraction limit and an annual maximum limit[4]. In order to increase the amount of water that can be used by abstractors the Current System Plus would allow additional abstraction at high flows. We are proposing to achieve this by setting a threshold above which abstractors could take additional water that does not count towards their annual limit. Above this threshold abstractors would still be restricted by their daily limit. The threshold would be set at a point where all abstractors could take their maximum daily licence quantities without impacting flows required for environmental protection.

We are aware that high flow water is not always of suitable quality; flood water, for example, may contain too much sediment or debris to be useful for abstractors. Clearly it is also important that high flows are abstracted safely. Despite these challenges we think that allowing additional abstraction at high flows will help increase the amount of water that can be used, whilst protecting the environment[5]. We also believe it will provide an incentive for abstractors to develop storage.

[4] Note the daily limit is often significantly greater than the annual divided by 365.

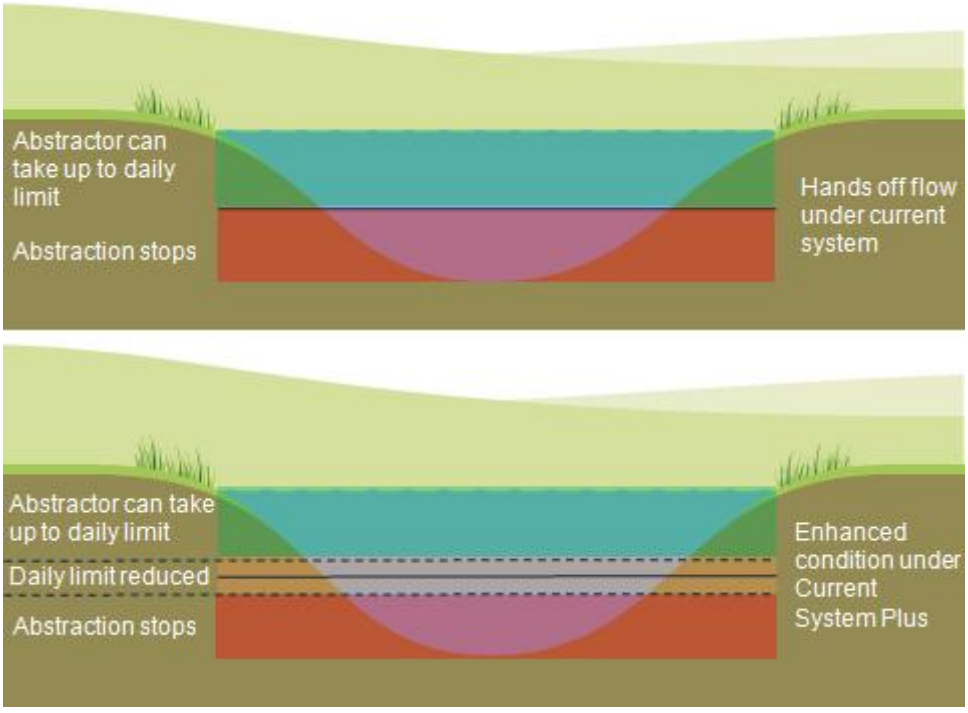
[5] High flows in summer can be important for water ecosystems and abstraction would still need to be controlled to maintain these benefits. The Environment Agency and Natural Resources Wales are developing and improving how they determine environmental flow requirements, including seasonal variability and high flow requirements (see Managing Abstraction in the Water Environment, December 2013 for more information).

Providing flexibility for abstractors that must stop abstracting at certain flows (enhanced catchments only)

In enhanced catchments, under the Current System Plus, abstractors who currently have a Hands-off Flow (HoF) condition on their licence, would have an equivalent flow based condition on their new abstraction permission. This condition would require daily abstraction to decrease before stopping. We believe this would help abstractors by reducing the frequency at which they have to stop abstracting entirely and allow abstractors to adjust to changing water availability more gradually.

New flow based conditions would be defined by grouping and simplifying previous HoFs in a catchment. For example, where there were previously several abstractors operating against several HoFs defined at a similar level, these would be merged into one and detailed in a catchment abstraction rules document. A window would then be defined around this flow point. When flows reduce to within this window an abstractor's daily abstraction limit would be reduced. When flows fall below it abstraction would cease. See figure A2.

Figure A2 shows how a previous Hands-off Flow could be converted into a condition under the Current System Plus.



We expect the orange area around the HoF to be defined as starting a percentage above the flow condition spanning to a similar percentage below it. For example, 5 per cent above and 5 per cent below may be appropriate. Further work is required to define these conditions which would have to be suitable to the catchment in which they operate.

Introducing a regulatory minimum level (basic and enhanced catchments)

Under the Current System Plus all abstractors who did not previously have a HoF would face a regulatory condition that requires abstraction to cease at the very lowest flows.

This 'regulatory minimum level' would be defined when moving to the new system and detailed in the catchment abstraction rules document. With our current climate we envisage that this would only be triggered for short periods of time during extremely low flows. This flow would be fixed so that, if the climate led to more frequent low flows, it would be triggered more often. This condition has a clear link with drought controls, as it would only function at very low flows. We intend to do further work to explore this linkage.

Water Shares

This option is based on the principle that abstractors hold shares which allow them to abstract a proportion of the water available for abstraction. This means an abstractor with a fixed share would be able to take more or less water depending on how much is available. An abstractor's allocation might vary but, unless they trade their shares, the share they hold stays fixed.

The way that the Water Shares option would operate for surface water abstractors is explained in the following two steps:

Step 1: Adjusted annual abstraction limits on existing licences would be converted into shares by the Environment Agency or Natural Resources Wales (see Chapter 5 in the consultation document). For example, if an abstractor is currently allowed to take 100 units of water without a hands-off flow, they would be awarded 100 high reliability shares. If an abstractor currently only has access to high flows due to their HoF, they would receive low reliability shares. This process would only be done once, when the new system is introduced (or when a new abstractor applies for water). This step would take place in basic and enhanced catchments.

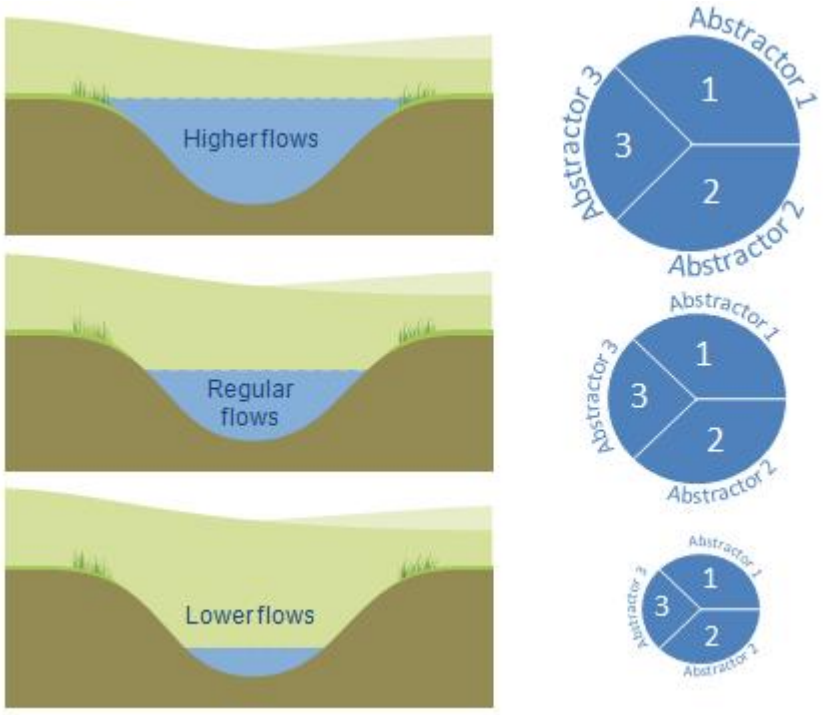
Step 2: The Environment Agency or Natural Resources Wales would regularly assess how much water is available to abstract for both high and low reliability shares, and allocate that volume to abstractors in line with the shares they hold. The Environment Agency or Natural Resources Wales would then let abstractors know how much water their shares have yielded. This is their allocation. Following the example above, during most conditions, 100 high reliability shares would still allow that abstractor to take 100 units of water. An abstractor with low reliability shares would see more variation in the amount they can take. When river flows are high, those shares could yield 150 units of water; as flows decrease they could yield 50 units of water, or even none at all, if it has been relatively dry.

Step 2 may need to be repeated frequently in enhanced catchments to ensure the system responds quickly to peaks and troughs in availability, for example, fortnightly. Different frequencies are likely to suit different environments. Where river flows are more responsive to rainfall a shorter period may be more appropriate. Where river flows are slower to react a longer period may be more appropriate. In basic catchments shares in a reliability group would either be on or off, depending on flows, and would not yield variable allocations. This is similar to how HoFs work in the current system.

Reliability groups

Figure A3 demonstrates the fundamental principle of Water Shares which is that each abstractor holds a share of the available water. The share any one abstractor holds stays fixed but, depending on availability, the total amount available changes.

Figure A3 shows how water allocations can vary whilst shares remain fixed.

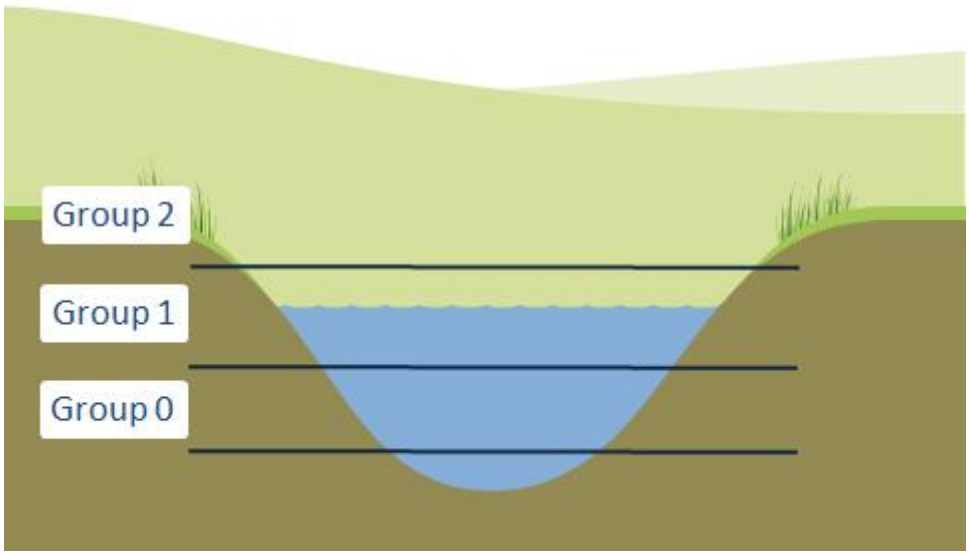


River systems and abstractors' needs are of course much more complex than this and so the approach to allocating shares must reflect this. For example, a farmer with a storage reservoir may have a licence that only allows abstraction when flows are high because that is when abstraction costs are low. On the other hand, an industrial abstractor may need to abstract every day of the year to keep their process operating and have a licence that allows this. If both of these abstractors were given equal shares it would not adequately take account of their current licences.

To meet these needs, shares would be divided into different groups of reliability. In our example above, the farmer's shares would only be active and yield an

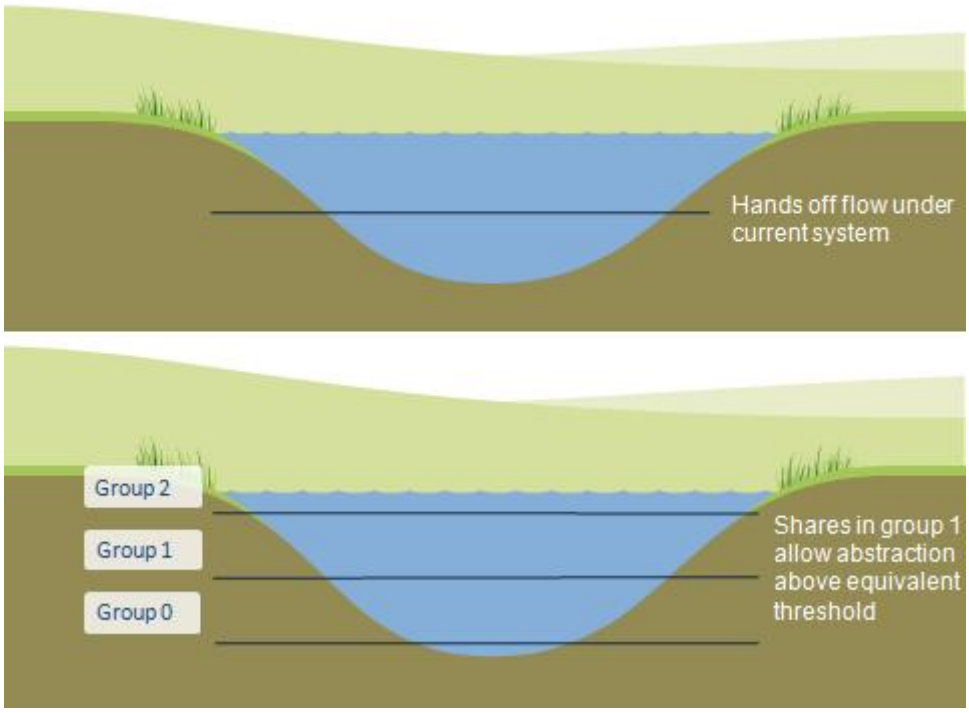
abstraction volume (an allocation) when flows are high, but the industrial abstractor's shares would be active at all but the lowest flows. The Environment Agency or Natural Resources Wales would communicate with abstractors to make it clear when abstractors can take water, and how much they can take.

Figure A4 illustrates how water could be divided into groups



In figure A4 there are three groups of shares; group 0, group 1 and group 2. Abstractors would get allocations from their shares when flows are above the threshold of their group. In this case abstractors with shares in group 0 would get a full allocation. Abstractors with shares in group 1 would get a partial allocation (around 65 per cent) and abstractors with shares in group 2 would not receive an allocation.

Figure A5 shows how a licence with a Hands-off Flow would be converted into shares in a certain group



The top cross section plot in figure A5 shows the HoF condition that an existing abstractor has under the current system. To ensure that the abstractor had equivalent reliability under the Water Shares system they would be awarded shares in group 1, which would be set up to stop yielding water at a threshold that is similar to their previous HoF.

Defining shares

Because water availability and the character of a water source can change substantially across a catchment, shares have to be allocated to units small enough to be managed consistently but big enough to be practical. Shares would be allocated to these 'management units'. Management units could be defined between existing CAMS assessment points[6]. This sort of unit could provide an appropriate balance between representing local detail and avoiding over complexity. The size and definition of these management units would have to be appropriate to local conditions.

[6] A point at which the flow from the upstream catchment is assessed.

The number of shares available in any group within any management unit would be defined simply by dividing the total amount of water available at a given flow by the initial volumetric value of a single share. We currently envisage that a share would yield a full allocation of 1 cubic metre of consumptive abstraction per year. If there was capacity for 1 million cubic metres of consumptive abstraction per year in a group there would be 1 million shares assigned to that group.

Allocating shares when moving to the new system

Abstractors would receive shares that take into account their previous licence and water usage (see section 8 of this annex, “Moving to a new system”). Shares would be located in appropriate management units and groups similar to the reliability of their previous licence.

An abstractor who returns none of the water they abstract and is located at the top of a catchment would receive consumptive shares equal to their annual abstraction limit following the move to a new system. If this annual limit was 10,000 m^3/yr they would receive 10,000 shares. If they did not previously have a HoF their shares would be assigned in group 0 (the most reliable group).

An abstractor who returns half of the water they take has an annual abstraction volume of 40,000 m^3/yr following the move to the new system and abstracts at the bottom of the catchment would receive 20,000 shares. If they had a previous HoF, their shares would be assigned to a group that gives a similar reliability to their previous HoF. These shares could be awarded either in the management unit they abstract from, in any upstream unit or in any combination of upstream units. This is because, by holding shares in an upstream unit they are ‘reserving’ that water which would flow down to their abstraction location. The ability to formally hold shares upstream of an abstraction point is an important feature of the Water Shares option and increases the scope for trading.

4.2 Groundwater

Because groundwater levels are generally significantly slower to respond to rainfall than flows in surface water it is generally not necessary to link abstraction quantities to water availability as closely. The different approaches taken by the Current System Plus and Water Shares are therefore not so relevant to groundwater management. Because of this we propose that the approach to linking abstraction from groundwater to water availability should be consistent between the two options even if the legal framework is slightly different to fit the respective options.

In enhanced catchments, both the Current System Plus and the Water Shares options would allow total abstraction from a groundwater unit, an area within which groundwater abstractions are hydrologically linked, to be altered slowly in response

to long term changes in groundwater availability. Groundwater availability could be tracked by, for example, comparing a historic record of long term average groundwater recharge with actual recharge[7]. The total groundwater abstraction permitted from a unit over a year could then be adjusted to fit actual recharge.

If the total permitted abstraction quantity from a groundwater unit needed to be altered in response to changing water availability, reductions or increases in permitted abstraction would be applied to all abstraction permissions in that unit in an equal and proportionate way. For example, consider a groundwater unit which, in the year 2025, supports abstraction of 100,000 units and has a 25 year average recharge of 400 mm/yr. Over a period of time, should that 25 year rolling average recharge decrease to 396 mm/yr (a fall of 1 per cent), the total annual groundwater allocation would reduce by 1 per cent to 99,000 units.

Each abstractor's annual allocation would change in response to a change in groundwater availability. In the example above, where availability reduced by 1 per cent, an abstractor licensed to take 100 units would be restricted to 99 units. Similarly, if long term average recharge increased, allocations would increase. This process changes annual limits not daily limits.

In most cases, adjustments would be made no more frequently than annually and would generally be based on a long term measure of availability. We envisage the allocation period starting in April so as to come after the previous winter's recharge period. The purpose of this reform is to ensure that groundwater abstraction does not exceed availability in the long term rather than to change the volume that can be abstracted in the short term. We will consider the potential need to make short term changes to groundwater abstraction as part of our work on links with drought management. We also expect these gradual and modest changes to groundwater abstraction to sit well alongside the more dynamic approach to surface water management. Abstractors who have access to both types of source would be able to make use of the natural buffering capacity of groundwater to support their activities when surface water flows are low.

The rules used to measure availability, as well as the definition of groundwater blocks, would be designed to suit local groundwater characteristics. The appropriate time period for measuring recharge, for example, is likely to be particularly sensitive to local groundwater characteristics. In some places, because of the nature of the rock that contains the groundwater and the proximity of that rock to a river, groundwater stores can fluctuate quickly and impact neighboring surface waters immediately. In these circumstances, groundwater abstractions would be regulated in the same way as surface water abstractions.

[7] Groundwater recharge is the process by which rainfall tops up aquifers.

5. Improving the measurement of discharges

Some abstractors consume most or all of the water they take for their business processes. Others take water, use it in their business processes, and return most of it back to the environment. An abstractor who consumes most or all of the water they take generally has a bigger impact on the environment than an abstractor who abstracts the same amount but discharges most of it back again locally. Under a new abstraction management system, in common with the existing system, abstractors who return more water to the environment would pay less than those who return less.

We also want to facilitate the use of discharges by abstractors downstream by making discharges more reliable. To make discharges more reliable, we are looking towards tightening up controls to require abstractors whose abstractions and discharges are close together to discharge a proportion of what they take. Abstractors whose abstraction and discharge points are more remote from each other, for example water companies, would also operate in a system that seeks to reliably allocate their discharges to other abstractors. We are still developing and assessing more detailed proposals on this (please see section 4.3 of the consultation document).

Our proposals suggest the need for more accurate measurement of returned water. However, the cost of quantifying discharges can be significant and varies for different types of abstractor. Some sectors, for example fish farmers, would struggle to measure their consumptiveness due to the nature of their sites. Discussion with abstractors has suggested that a voluntary rather than a mandatory mechanism should be considered.

With respect to paying for water, the current charging system is based on broad sector based assumptions of how much abstracted water is consumed, without taking into account differences between abstractors within the same sector. We propose that abstractors who are willing and able to measure how much water they return locally to a river should be able to provide this evidence to the Environment Agency or Natural Resources Wales. If their measured consumptiveness differs from the standard assumption their charges would be adjusted accordingly.

In addition to allowing abstractors to challenge standard assumptions we are also proposing that the Environment Agency and Natural Resources Wales work with key sectors to review those standard assumptions in advance of reform so that the standard assumptions are the best they can be before we move to the new system.

6. Facilitating trading

As discussed in section 4.5 of the consultation document we want to make it easier for abstractors to trade abstraction permissions where there is demand to do so. The proposals discussed below apply to enhanced catchments only.

6.1 Trading surface water in Current System Plus

Because the Current System Plus option is based on the approaches that underpin the current regulatory approach, the basic approach to abstraction permissions trading in surface water remains unchanged from that used in the current system. The main difference is that under the Current System Plus the regulator would pre-approve a limited range of simple trades, for example, temporary trades, such as those for less than a year, from an upstream abstractor to a downstream abstractor. Moving abstraction downstream is generally lower risk than moving it upstream.

Trading would be facilitated by a system to help match abstractors who want to sell with those who want to buy. This system would aim to remove as much of the complexity as possible and present clearly which trades are possible and which are not. An abstractor should be able to participate in the trading process without understanding the mechanics behind it.

Pre-approved trades would be beneficial because they would take place much more quickly, potentially the next working day, than trades that require individual approval, which can take up to three months to approve (up to 4 months if advertising is required). The type of pre-approved trades allowed would be set out in the catchment abstraction rules document. Rules could also be presented online on a map so each individual abstractor could see all the other abstractors they could trade with, the maximum allowable volumes and relevant hands off conditions.

Complex trades would still require individual approval by the regulator before they could take place.

Figure A6 shows that abstractors who wish to make pre-approved trades are restricted to moving abstraction downstream. For example, an abstractor in unit ‘A’, who is at the bottom of the catchment, can buy from an abstractor in any other part of the catchment. An abstractor in ‘B’, on the other hand, is at the top of the catchment and has no abstractors upstream. This means abstractors in ‘B’ would be limited to trading with other abstractors in ‘B’. An abstractor in unit ‘C’ would be able to buy from abstractors in ‘D’ or ‘E’.

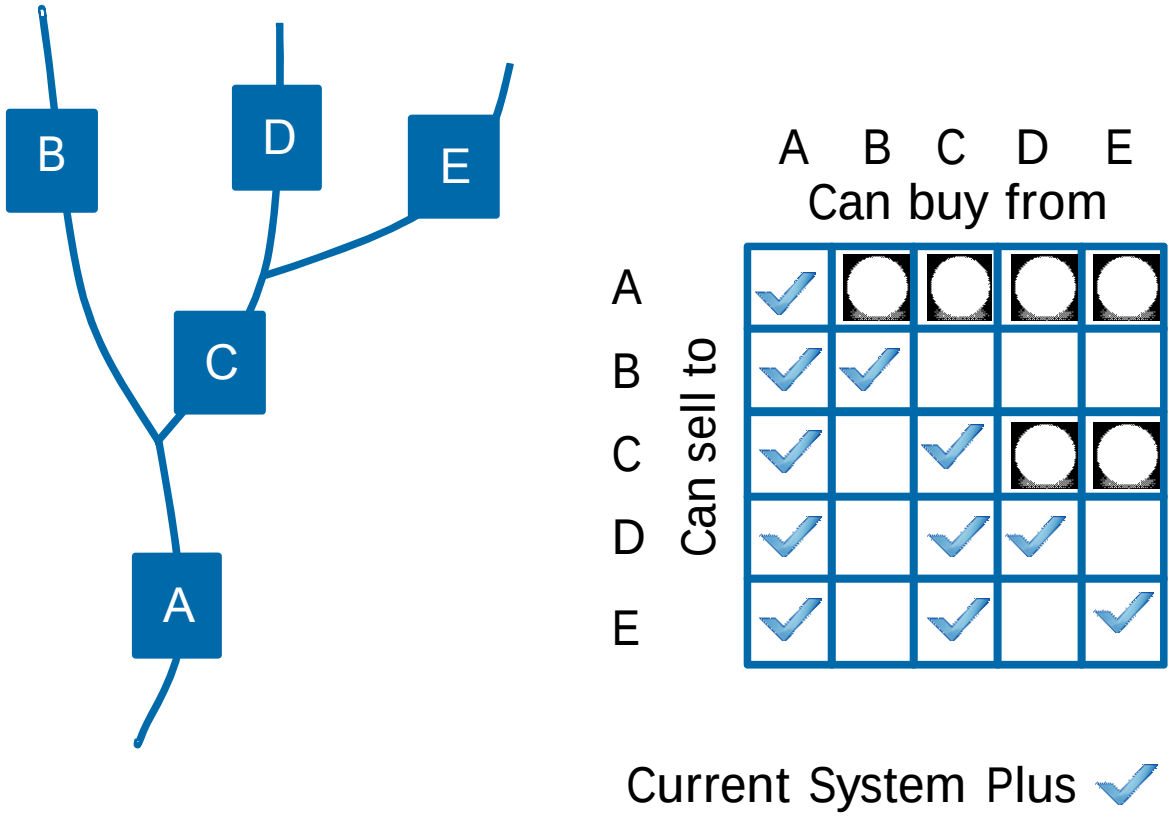


Figure A6 shows a simplified catchment with five management units. It sets out the sorts of trades that we expect could be pre-approved under the Current System Plus.

6.2 Trading surface water in Water Shares

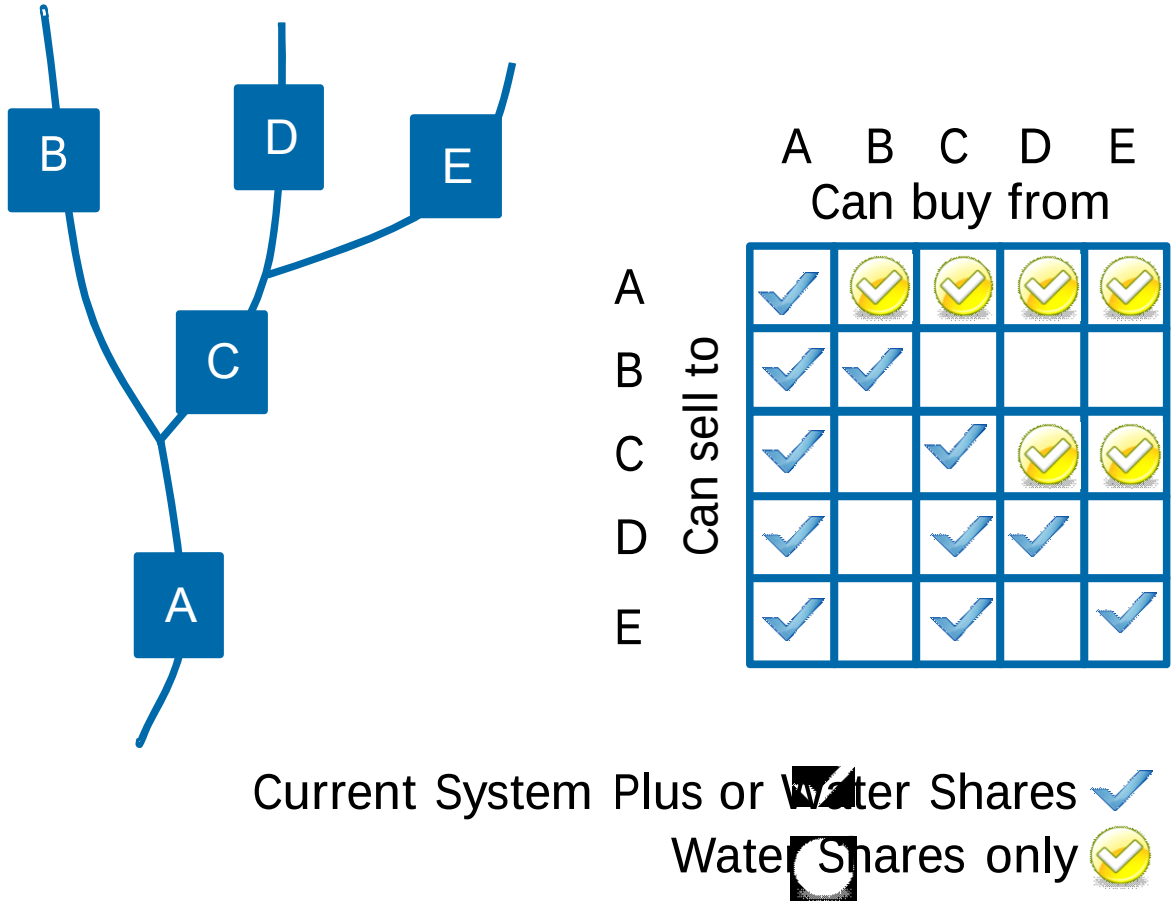
The Water Shares option has been designed to facilitate trading. The main advantages over Current System Plus are:

- The introduction of fixed period allocations would make short term trading much easier;
- The number and variety of trades that can be pre-approved is greater under Water Shares. In particular it would allow water to be traded upstream relatively simply; and
- Fixed period allocations would also support the use of rivers to reliably trade water from reservoirs, groundwater or re-use schemes.

It would be possible to trade Water Shares as well as short term allocations. Both markets would be facilitated by a system to help match abstractors who want to sell with those who want to buy. This system would aim to remove as much of the complexity as possible and present clearly which trades are possible and which are not. An abstractor should be able to participate in the trading process without understanding the mechanics behind it.

Because shares are set out in a standard framework and assigned transparently to groups and management units, the potential for trading is much clearer. This means that, under Water Shares, the regulator would pre-approve trades upstream as well as downstream. Because fixed-period water allocations would be issued it would also be possible to facilitate short-term trading in allocations that would take place without transferring the shares held by abstractors, even temporarily.

Figure A7 shows a simplified catchment with five management units. It sets out the sorts of trades that we expect could be pre-approved under the Current System Plus and additional trades possible under Water Shares.



As figure A7 shows, the Water Shares option would increase the possible number of pre-approved trades that could take place within a catchment. In common with the Current System Plus, an abstractor in unit ‘A’ could still buy from abstractors in all other units. The main difference would be that an abstractor in unit ‘A’ could potentially sell to all other units. This is because it would be possible for an abstractor in unit ‘A’ to hold shares in units upstream whilst abstracting from unit ‘A’. That abstractor would then be able to trade the allocations that result from those shares with abstractors upstream. Following this principle an abstractor in unit ‘C’ could also be able to sell to abstractors in units ‘D’ and ‘E’.

Restrictions remain, for example, an abstractor in unit ‘B’ could not directly buy from or sell to those in units ‘C’, ‘D’ or ‘E’. This is because reducing abstraction in ‘C’, ‘D’

or ‘E’ would not make more water available at ‘B’. To get around this it would be possible for an abstractor in unit ‘B’ to make use of spare water in unit ‘C’, ‘D’ or ‘E’ if they could trade via an abstractor in unit ‘A’. For example, an abstractor in unit ‘B’ could trade with an abstractor in ‘A’ that holds shares in ‘B’ already. The abstractor in ‘A’ would secure additional shares or allocations in unit ‘C’ then sell their surplus shares or allocations from unit ‘B’ to the abstractor in ‘B’.

Water Shares maintains the requirement that trades are between abstractors who are hydrologically connected. However, by defining abstraction permissions more clearly, the Water Shares proposal expands the scope for pre-approved trading by making more pre-approved trades possible than under the Current System Plus.

Abstractors would be able to trade their shares to tailor the water permissions they hold to meet their needs. For example, an industrial user with steady demand and established processes that cannot be interrupted easily could seek out shares in the groups that allow abstraction at low flows from abstractors who are less concerned about reliability, to increase the resilience of their access to water. If an abstractor has the potential to store water they could secure less reliable shares and use high flows to top up their storage.

The introduction of time-bound allocations also supports the transfer of water through “put and take‟ schemes (putting water into a river from a reservoir, groundwater storage or from a reuse scheme to be abstracted downstream). We believe this would help abstractors collaborate to finance investment in storage projects. So for instance, a number of irrigators could invest in a reservoir in part of the catchment and the water could easily be transferred to those irrigators when they need it or sold to others.

6.3 Trading groundwater

Just as the approach to linking groundwater abstraction to groundwater availability is common to both reform options, the approach to facilitating trading between groundwater abstractors is also common between the Current System Plus and Water Shares options. This section covers trading between groundwater abstractors. In some circumstances it might be possible to trade between groundwater and surface water, however this will be dependent on local conditions and individual assessments of risks (this is different from put and take schemes described above when ground water is abstracted and then released into surface water).

Key elements of reform are that:

- Some groundwater trades would be pre-approved;
- Pre-approved trades would be supported by an understanding of the site-specific risks of groundwater abstraction;

- Regulatory activity to pre-approve trades would focus on groundwater units with the greatest demand and potential for trading[8]; and
- Pre-approval would only be applied to temporary trades.

The nature of groundwater abstraction means that, within a groundwater block, the risk presented by taking a quantity of water at one location can differ significantly from the risk presented by taking water from another. In order to pre-approve groundwater trades it is necessary to have an understanding of the risks presented by abstraction at a given location.

When assessing the potential risk presented by a groundwater trade it is important to consider the impact that the temporary increase in abstraction at the buyer's location could present. Key risks include:

- Disrupting the water supply of a nearby abstractor;
- Impacting local river flows;
- Impacting wetlands that are supported by groundwater; and
- Local groundwater issues such as mobilising historic contamination or risks from reducing levels such that seawater can contaminate the aquifer.

Where there is sufficient demand for trading the Environment Agency or Natural Resources Wales would develop a process to understand these location-specific risks and define a maximum volume of water that can safely be added to an annual limit as part of a short term trade. Trades would be restricted to taking place within a groundwater unit and pre-approved trades would be limited to those lasting less than a year. This approach should see groundwater abstraction naturally move from more sensitive locations to less sensitive locations. Over time this should reduce the environmental impact of abstraction.

7. Operating existing local arrangements for water resources management in a new abstraction system

Any reform option would have to operate effectively with existing arrangements in place for the local management of water resources that currently exist alongside abstraction licences. For example, Water Resource Management Arrangements have been set up under section 20 of the Water Resources Act 1991. These are not abstraction licences but significantly influence how water is managed within and between catchments. Water Resource Management Arrangements can include:

[8] We envisage that suitable aquifers would usually be limited to principal aquifers or secondary aquifers with significant associated abstraction.

- Requirements to augment river flows via reservoir discharges;
- Limits to surface water abstraction under certain conditions;
- River flow augmentation from groundwater abstraction;
- Limits to total abstraction from a group of licences; and
- Bulk transfers of water between catchments.

There are other legal arrangements in place that a new abstraction system needs to work alongside. For example, Section 158 agreements, which the regulator can enter into with a water or sewerage company, a local authority or the owner/occupier of land to arrange for works (or the maintenance of works) to be carried out in connection with water resources management. These agreements can, for example, detail the manner in which a reservoir is to be operated.

Following consultation, and once a preferred option has been identified, further work will be carried out to assess how these arrangements best fit with the chosen approach to reform.

8. Moving to a new system

When current licences are prepared for use in any reformed abstraction management system the Environment Agency and Natural Resources Wales would need to take into account that currently unused volumes could be used or traded in the future. In some situations the use of currently unused water could lead to unsustainable abstraction and cause deterioration of the environment. This section provides more information on the possible approaches to reducing the risk of deterioration by removing unused volumes (this is covered in Chapter 5 of the consultation document).

Universal approach

Possible approach	**Impact on abstractors**	**Impact on the environment**
1A) Remove some unused water from all licences in all catchments (green, orange and red areas in figure A8 below). For example by: • Limiting licences to average annual abstraction quantities over a historical period; • Limiting licences to an average of a number of peak annual abstraction quantities over a historical period; • Removing some unused portion of licences from all abstractors, but still allowing some flexibility in abstraction limits. For example, annual average abstracted quantity plus a percentage of annual licensed quantity.	Treats all abstractors the same and is relatively simple. Could free up additional water in some catchments for new abstraction. Depending on the method of calculation, abstractors with more variable annual abstractions could be negatively affected.	Will reduce much of the risk of deterioration May be over precautionary in some catchments where abstracting unused water has no impact or a limited impact today. May not reduce fully licensed abstraction enough in some catchments to ensure the environment will not deteriorate.

A universal approach would apply the same method for considering previous use in all catchments, regardless of the availability of water in that catchment. To prevent deterioration the approach would need to protect the most stressed catchments, which could result in more water being recovered in some catchments than may be needed to prevent deterioration. This approach would, however, provide some additional water for future growth in catchments which currently do not have any spare water that can be allocated to others.

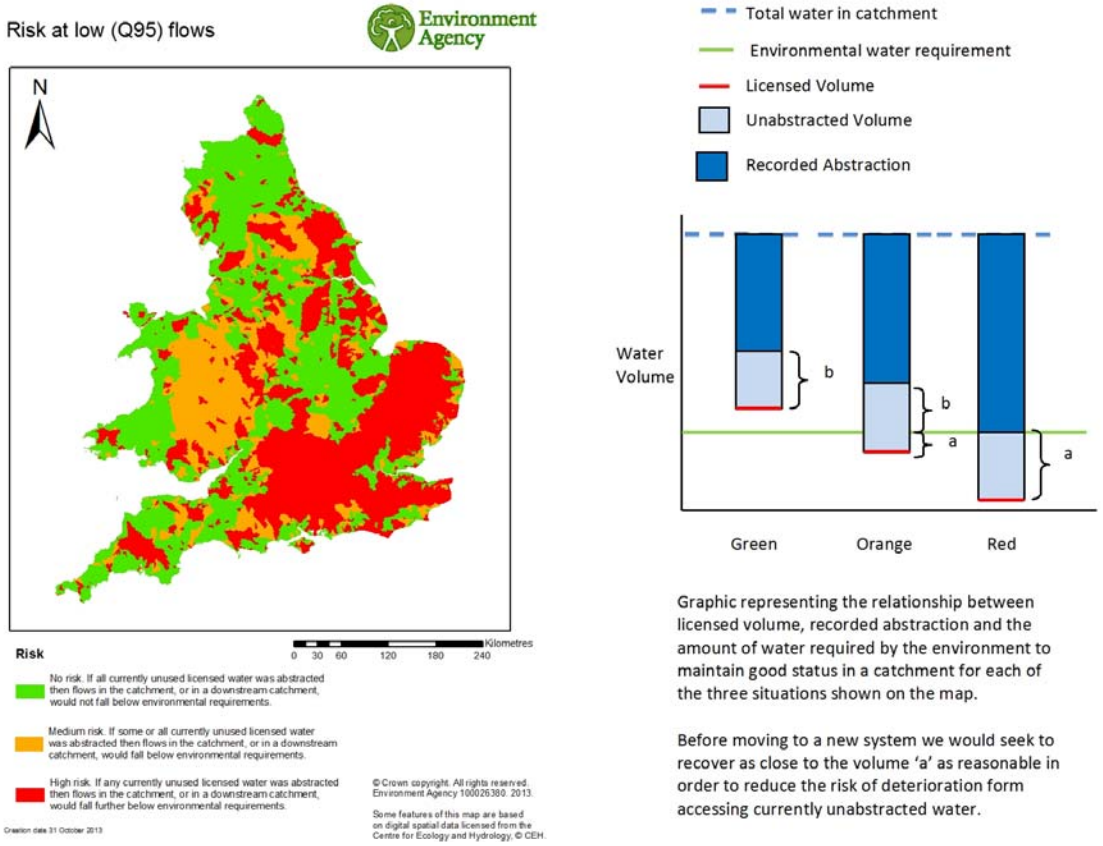


Figure A8: Map showing catchments at risk of deterioration if unused water was actually abstracted at low flows (Q95[9]).

Catchment specific approach

As part of this approach we would consider the methodology for converting licences on a catchment by catchment basis. The approach adopted in each catchment would be dependent on the amount of water resource available in that catchment and in those downstream.

In each catchment the Environment Agency and Natural Resources Wales would need to establish the amount of water available for abstraction without causing

[9] The flow of a river which is exceeded on average for 95% of the time. This would be typical of a low summer flow.

deterioration and then subtract the amount of water abstracted historically. This assessment would have to take into account changes in water availability throughout the year. The remaining volume would then be split between abstractors based upon their historic use and possibly licensed volumes (some possible ways of considering previous use are described in the table below).

Using this approach we would maximise the licensed volume in each catchment whilst protecting against deterioration due to increased demand.

It may be possible to restrict this approach to catchments where trading could trigger deterioration (enhanced catchments); however, we appreciate that there are many other reasons why currently unabstracted water could be used in the future.

Possible approach	**Impact on abstractors**	**Impact on the environment**
2A) Remove some unused portions of licensed water from all abstractors in catchments that face a risk of deterioration if currently unused water were to be used in the future (orange and red areas only in figure A8 above). Step 1: Regulator calculates how much licences need to be curtailed in order to eliminate the risk of deteriorating the environment in each catchment (represented by "a" in figure A8 above). Step 2: Regulator considers how that licence volume reduction is spread across licence holders. For example: • In proportion to average annual abstraction quantities; • In proportion to an average of a number of peak annual abstraction quantities; • In proportion to a combination of annual average abstraction and annual licensed quantity.	Allows less stringent transition rules for abstractors in lower risk catchments Depending on the method of allocation, abstractors with more variable annual abstractions could be negatively affected.	Will minimise the risk of deterioration due to unused licensed volumes.
2B) Remove some unused portions of licences from all abstractors in catchments that face a risk of deterioration only if trading has been facilitated and so the risk of unused water being used is increased. Regulator would calculate quantity to be removed to eliminate risk of deterioration in each catchment and spread the volume reduction across abstractors on an agreed basis.	Allows less stringent approach for abstractors in low risk catchments Depending on the method of calculation, abstractors with more variable annual abstractions could be negatively affected.	Will minimise the risk of deterioration in catchments that could experience a high take up of abstraction trading.

Some abstractors wish to hold abstraction permissions that allow them to abstract more than they regularly use so that they are able to cope with unusual situations. This is true of public water suppliers who often hold licences that are only used in exceptional circumstances such as droughts. Temporary deterioration of the environment during an emergency or drought situation is permitted under the Water Framework Directive (WFD). But there is a risk that if licences which are currently reserved for emergency use are traded and regularly utilised then there could be deterioration within a catchment, which contravenes WFD requirements. Conversely, there is a risk that water supplies could fail during a drought if abstraction permissions were limited to recent use. These risks could be mitigated by:

- Not allowing emergency use abstraction permissions or quantities to be traded; or
- Removing these emergency use quantities from standard abstraction management and then using powers to grant the use of the abstractions in emergencies.