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# Water Deficit Policy Options

## Background

The Final Draft RMP includes the following GPOs on water deficits:

| | |
|---|---|
| **Policy 2B4** | To require through Plan Conformance the development and implementation of Water Management Plans to address any Current Deficit Areas or subwatershed that could become deficit areas based on projected development and water uses, to ensure sustainable water supply, water resource and ecological values. |
| **Objective 2B4a** | Water Management Plans shall include provisions to reduce consumptive and depletive uses of ground and surface waters as necessary to reduce or prevent deficits in Net Water Availability; or to ensure continued stream flows to downstream Current Deficit Areas from Existing Constrained Areas, to the extent practicable within each zone. |
| **Objective 2B4b** | Proposed increases in water use, including consumptive or depletive water uses, within a Current Deficit Area or an area where the proposed increase would cause the HUC14 subwatershed to become a Current Deficit Area shall provide mitigation equal to 125% of the proposed new consumptive or depletive water uses within the same HUC14 subwatershed through: a permanent reduction of existing consumptive and depletive water uses; ground water recharge in excess of the requirements of N.J.A.C. 7:8 (Stormwater Management Rules); or other permanent means. |
| **Policy 2B5** | To conditionally provide water availability within Current Deficit Area. |
| **Objective 2B5a** | A Current Deficit Area subwatershed that is primarily within the Existing Community Zone shall be assigned a Conditional Net Water Availability of 2 percent of Ground Water Capacity, based on the Low Flow Margin Method, conditioned upon prior implementation or commitment for implementation of the 125% mitigation requirement in Objective 2B4b. |
| **Objective 2B5b** | A Current Deficit Area subwatershed that is primarily within the Protection Zone or Conservation Zone shall be assigned a Conditional Net Water Availability of 1 percent of Ground Water Capacity, based on the Low Flow Margin Method, conditioned upon prior implementation or commitment for implementation of the 125% mitigation requirement in Objective 2B4b. |

Of the 183 HUC14 subwatersheds, 114 show deficits ranging from less than 100 gallons per day (gpd) to more than 7 million gallons per day (MGD), within the following ranges:

| Deficit (MGD) | # of HUC14s |
|---|---|
| 0.0001 – 0.050 | 22 |
| 0.051 – 0.100 | 7 |
| 0.101 – 0.250 | 25 |
| 0.251 – 0.500 | 17 |
| 0.501 – 1.000 | 16 |
| 1.000 – 7.100 | 17 |
| TOTAL | **114** |

The highest deficits are primarily caused by major depletive uses. In some cases, clean water is delivered across subwatershed and watershed lines to users. One example is the Morris County MUA well fields in the Lamington and Drakes Brook watersheds. In other cases, the water is used within the subwatershed but then moved as wastewater to another subwatershed for treatment. The upper Rockaway River watershed is an example. For a few cases, the inter-watershed transfers occur over a very short distance (e.g., just past the subwatershed boundary). Phillipsburg is an example, where the source subwatershed is next to the Delaware River, and the wastewater is to the Delaware River itself. The discharge is calculated as a depletive water use, but may not be an actual problem because the discharge is so close to the area where ground water would normally flow.

Because the largest deficits are primarily caused by inter-watershed transfers, deficit solutions may similarly require infrastructure solutions. Such solutions may have effects outside of the Highlands Region, and therefore NJDEP must be closely involved in the analysis and approval of those deficit reduction approaches.

Conditional water availability is assigned to the 114 deficit subwatersheds based on the dominant Zone, as described in the RMP policies. The largest conditional availability is 54,100 gpd (0.0541 MGD), while the smallest conditional availability within a HUC14 that includes significant area within the Highlands Region is 1,000 gpd. The results are as follows:

| Conditional Availability (gpd) | # of Potential Homes (Consumptive Use)* | # of Potential Homes (Depletive Use)* | # of HUC14s |
|---|---|---|---|
| 100 to 5,000 | <1 to 57 | <1 to 17 | 19 |
| 5,001 to 10,000 | 57 to 115 | 17 to 33 | 28 |
| 10,001 to 25,000 | 115 to 287 | 33 to 83 | 52 |
| 25,001 to 50,000 | 287 to 575 | 83 to 166 | 14 |
| 50,001 to 54,100 | 575 to 622 | 166 to 180 | 1 |
| | | TOTAL | **114** |

*Based on 300 gpd per single family home for depletive uses, and 29% of 300 gpd for consumptive uses. Values are rounded to nearest whole number.

As can be seen, the conditional availability quantities are very limited, exceeding 25,000 gallons per day in only 15 subwatersheds. The average conditional availability is less than 14,000 gpd per HUC14 subwatershed.

**Policy Issues**

Three primary policy issues have been raised in public debate regarding public deficits:

1. The appropriateness of providing conditional water availability in deficit areas
2. The certainty of achieving mitigation in a manner that is protective of ecosystems and water resources
3. What happens if mitigation is not feasible

*Conditional Availability*

The policy of conditional availability and mitigation for new consumptive and depletive water uses was created to provide an opportunity for private and public sector development activity to help reduce or eliminate existing deficits. It also avoids the possibility of a discriminatory policy, where customers of water purveyors (which are regulated by NJDEP) are treated differently than self-supplied water users (which are not). The wide range of deficits, the wide range of potential solutions, and the fact that Plan Conformance is voluntary in the Planning Area make a policy of preventing new water uses a less useful as a tool than might be true in other situations.

It should also be noted that the policy of conditional availability relies on different implementation authorities in the Preservation and Planning Areas. In the Preservation Area, the Council has direct legal authority for project review and mandatory conformance. In the Planning Area, the Council has influence through the RMP on NJDEP permit decisions for new and increased water allocations, which can be limited to those that receive a consistency determination from the Highlands Council. (It should be noted that the largest deficits correspond to areas where NJDEP has the most influence on allocations through its permit programs, while the smaller deficits occur in areas where NJDEP has less influence because its water allocation permits address a relatively small percentage of total use.) The Council also can review local development decisions, but only in conforming municipalities or through the Water Quality Management Plan process. Therefore, the Council's ability to implement a policy preventing new water uses on new consumptive and depletive water uses in the Planning Area is limited, relative to the Preservation Area.

It is critical to note that the very limited quantity of Conditional Water Availability is specifically intended to drive the creation of management plans to reduce and eliminate deficits. Council staff recommends that these plans be called **Water Use and Conservation Management Plans**, rather than Water Management Plans or Water Deficit Management Plans, to better reflect their role in both deficit and non-deficit subwatersheds.

All of these considerations played a role in the staff recommendation and Council decision regarding water deficit policies. Still, there are potential policy alternatives to the provision of conditional availability as currently proposed that retain the central concept but modify its application. They include:

- Splitting the policy so that the Preservation Area (where conformance is mandatory) is treated differently from the Planning Area (where conformance is voluntary). Several issues are specific to the Preservation Area:
    - Most new Preservation Area development will be either on septic systems and very large lots (from 25 to 88 acres), or on exempt properties. Large lot development can

easily be designed so that consumptive water use is more than offset by recharge, through infiltration of rooftop runoff and through use of landscaping techniques such as rain gardens. The domestic supply wells and the recharge are both on site.

- Exempt properties are not subject to RMP controls, but RMP Plan Conformance could require that conforming municipalities ensure offsets to such development. However, the most effective measure, on-site infiltration, will not be available to the municipalities and off-site options may be very limited because much of the landscape is still undeveloped or in dedicate open space.
- The final type of development, and indeed the only major development, anticipated in the Preservation Area, will be on designated redevelopment sites. The application of on-site mitigation requirements to redevelopment is very appropriate for grayfield development, but may be inappropriate in brownfields where recharge could induce movement of pollutants.
- Given the limited existing development in the Preservation Area, enhanced off-site recharge will be difficult in some situations, and off-site water conservation options will be very limited.
- Preservation Area subwatersheds, however, have relatively small water deficits which in nearly all cases are entirely due to consumptive uses rather than depletive uses.

Therefore, Council staff recommends that Water Use and Conservation Management Plans, as a requirement of Plan Conformance, be used as the best option for deficit reduction. These plans could be developed quickly for areas with minor deficits (9-15 months), will require solutions that are entirely within the subwatershed, can be very effective for relatively small deficits, and should incorporate mitigation requirements. Very little development will occur in the Preservation Area during this period due to the NJDEP Preservation Area rules.

- Modification of the 125% mitigation requirement so that it is scaled to the size of the water deficit, the size of the proposed use, or both. A maximum percentage of 200% of the new consumptive/depletive water use is recommended.[1] There are several considerations behind this approach:
  - The larger deficits are related to more highly developed areas. Such areas have a larger water customer base and therefore more opportunities for demand-side (consumer) conservation. They also have more water infrastructure, and therefore more opportunities for supply-side (infrastructure) conservation such as reducing water losses from leaks. These benefits will apply regarding both consumptive and depletive water uses
  - Highly developed areas also have more existing buildings and older stormwater infrastructure, presenting more opportunities for enhanced recharge through retrofits that meet modern standards for stormwater infiltration. However, where the water is from another subwatershed (a depletive use), enhanced recharge in the developed receiving area will provide no benefit to the deficit subwatershed.

[1] It should be noted that this is a completely different metric than NJDEP's requirements for maintenance of 100% of pre-construction recharge; there is no direct linkage between the amount of natural recharge on a site and the amount of proposed water use on that same site. The latter may be smaller or larger than the former.

- Highly developed areas also tend to have higher land values. New water uses will tend to be for development with higher economic yields. Therefore, they should have a greater ability to absorb the costs of mitigation.
- By linking mitigation requirements to the quantity of the proposed consumptive or depletive use, the RMP would create an incentive for efficient water uses, and would help ensure that only the most economically viable land uses are approved in the highest deficit areas.
- Having a scaled mitigation project would preferentially reduce the deficits more where higher deficits exist.

- Require that mitigation be provided prior to construction in the HUC14 subwatersheds with the greatest deficits. For the reasons described in the prior point, mitigation through demand- and supply-side conservation will be much easier in high-deficit areas, and on-site mitigation may be more difficult than in less developed areas. Therefore, prior mitigation should be feasible. The following table is provided as a recommendation for application of the combined policies of enhanced mitigation and prior mitigation.

**Conceptual Approach to Scaled Mitigation Requirements**

| | **Proposed Consumptive or Depletive Water Use (gpd)** | | | | |
|---|---|---|---|---|---|
| **Deficit (MGD)** | <= 1,000 | 1,001 – 5,000 | 5,001 – 10,000 | 10,001 – 25,000 | >25,000 |
| 0.0001 – 0.050 | 125% | 125% | 125% | 150% | 150% |
| 0.051 – 0.100 | 125% | 125% | 125% | 150% | 150% |
| 0.101 – 0.250 | 125% | 125% | 150% | 150% | 175% |
| 0.251 – 0.500 | 125% | 150% | 150% | 175% | 200% |
| 0.501 – 1.000 | 125% | 150% | 175% | 175% | 200% |
| 1.000 – 7.100 | 150% | 175% | 175% | 200% | 200% |

Green shading indicates where mitigation would be required prior to construction. In all other scenarios, mitigation could occur prior to, coincident with or following construction, based on the approved mitigation schedule.

- Inclusion of mandatory provisions for water supply utilities that their water demands from the deficit areas not increase while the water deficits exist. This approach would help ensure further conservation, but would not alone ensure deficit reduction. Constraints include the fact that Plan Conformance is for municipalities and counties, but not for water utilities. Note that this approach is not a moratorium on connections, but rather a constraint on delivered water quantities. It would include a prohibition on increased water allocations.
- Identification within the NJ Statewide Water Supply Plan of areas with the highest water deficits, which will allow NJDEP to work with the Highlands Council under the Water Supply Management Act and the 1981 Water Supply Bond Act to investigate in detail the areas water resources, current and future demands and options for addressing the deficits, and to determine the feasibility of these options.

- Imposing requirements for more detailed and aggressive Water Use and Conservation Management Plans, more restrictive controls on consumptive and depletive uses, and more extensive mitigation regarding the subwatersheds that have such high deficits that mitigation alone is unlikely to make a significant difference in the deficits. The Water Use and Conservation Management Plans should explicitly consider implementation of major water development projects to overcome the deficits.
- Requiring through Plan Conformance that municipalities ensure a timely reduction of water deficits. In many circumstances, the result of such a policy could be that deficit reduction would occur prior to use of conditionally available water, and could be augmented by 125% mitigation in specific developments as they occur. The more limited the existing developed lands in a municipality, the more difficult it will be to meet such a provision.

*Certainty of Mitigation*

Questions have been raised regarding how certain the technology and requirements would be in achieving mitigation. The Water Deficit Reduction Program calls for the use of formal agreements and escrow accounts to ensure implementation of mitigation plans. However, the questions have been more about technology and impacts rather than process. Issues include:

- **Recharge Technology** – The recharge technology relied upon by the RMP is the same as relied upon by NJDEP in its Stormwater Management Rules and Best Management Practices Manual. These techniques have been incorporated into BMP manuals and both local and state regulations throughout the northeastern part of the country. USEPA and other agencies around the country have conducted research on their effectiveness. If the methods are appropriate for stormwater management practices, then they are also appropriate for deficit mitigation. As these methods currently have the approval of NJDEP, the Highlands Council should endorse their use. The Council should also continue to track ongoing BMP research, and should implement the science agenda components that will monitor subwatershed changes based on development, redevelopment and deficit reduction.
- **Recharge Impacts** – There are several different issues regarding impacts.
    - First is whether impacts of recharge are felt quickly or slowly by the hydrologic system. Technical studies in areas with relatively high water tables (typical of the Highlands Region) show that infiltration of water to the ground water table (recharge) happens relatively rapidly due to the short travel distances involved.
    - Second, confusion sometimes occurs regarding the difference between time necessary for recharge to occur (days to weeks) and time for that water to reach its natural outlet, which can range from years to millennia. However, the time of travel to a natural outlet is not the key issue. Recharge increases the elevation of the water table and therefore the "head" or pressure gradient of an aquifer, which is transmitted through the aquifer much faster than the actual water travel time. So, increased recharge causes an increase in stream base flows relatively rapidly, much as water being pumped <u>from</u> an aquifer creates a relatively fast decrease in stream base flows.

- The third issue is whether the location of the recharge benefits the same aquifer system or streams that are affected by the new consumptive or depletive water use. This legitimate issue is the basis for mandating that the mitigation occur within the same subwatershed as the withdrawal, not the use. There can be situations where the use is from an aquifer, but the recharge moves more directly to stream base flow instead of to the aquifer, or where the timing of the benefit to stream flow differs. This possibility is one reason that the conditional water availability was limited, as discussed above. It is also a reason why NJDEP requires under its water allocation permit process that any new well be tested to ensure that it does not damage nearby wells, wetlands and stream flow. Short of extensive (and expensive) ground water modeling for every new development and aquifer, it is not feasible to ensure that recharge benefits the exact source of the water being used. However, by requiring that the mitigating recharge be in the same subwatershed, stream flow in that subwatershed will benefit regardless.
- A "purest" approach, requiring that ground water uses be allowed only if the mitigation precisely offsets both the quantity and timing of its impact on stream flow, is not feasible and is the equivalent of a declaration that no ground water should be used for water supply. To our knowledge, no regulatory agency uses this approach.

- **Water Conservation Techniques** – Water conservation technology has been proven over time, including major conservation gains in New Jersey based on State and national requirements for improved water using fixtures and appliances. Therefore, the effectiveness of the technology is not in doubt. A more legitimate issue is one of ensuring that conservation technology and techniques actually occur and in a timely manner.
  - Generally, residential appliances and fixtures, once installed, are not removed and retain their effectiveness. The same is true of office building fixtures. In most programs, objectives are established that allow for some loss of effectiveness over time; in essence, the program objectives "overshoots" the actual need to ensure success. Progress can be tracked through billing records of water purveyors.
  - Industries and water-using commercial operations have incentives to maintain water conservation once implemented, as it reduces their costs for both water supply and wastewater treatment. Because these entities are either customers of public utilities or have water allocation permits, their progress can be tracked individually over time.
  - Lawn irrigation systems tend to remain in place once installed, but they may require more monitoring to ensure that upgraded systems are being used properly, as owners can manually override the systems and may not maintain them properly. Progress can be tracked in the aggregate through peak water use rates of water purveyors.
  - Agricultural irrigation practices also tend to remain in place once installed, and NJDEP is strengthening its oversight of agricultural water certifications to ensure proper practices. Where agricultural conservation is implemented as a mitigation project, the contracts should require system maintenance and proper use. Such contracts must consider and address issues of crop changes over time.

- One potential improvement to the proposed RMP would be to require monitoring and compliance evaluations by an outside expert party as a condition of approval. While this provision can readily be included in water management plans, it should be considered for project-specific mitigation as well.
- Water rates, and in particular inclining block rates or summer peak use rates, have potential for reducing water use through pricing signals to the consumer, especially if combined with customer education so that they notice the link between the rate structure and their water supply bills.

- **Aggregate Impacts of Mitigation** – The final policy issue relates to "proof of concept" for deficit reduction. The history of water deficits in the northeastern United States (and most other locations) is that they are addressed only when a major drought endangers supplies to major developed areas. The solutions are nearly always primarily based on new infrastructure (e.g., reservoirs, interconnection pipelines, well fields), though many include conservation to reduce infrastructure costs. The RMP is fundamentally different in that it focuses on ecological impacts of deficits that are in many cases very small relative to historic norms. Can Water Use and Conservation Management Plans and the recommended mitigation requirement truly achieve deficit elimination? The difficulty of deficit reduction is proportional to deficit size.
  - As discussed above, nearly half (54) of the 114 deficit subwatersheds have deficits of less than 250,000 gpd, or 0.25 MGD. 71 deficits are less than 500,000 gpd or 0.5 MGD. 29 are less than 100,000 gpd or 0.1 MGD. These deficits are very small relative to the deficits historically addressed by major infrastructure projects. It should be relatively easy for deficits of this nature to be addressed through Water Use and Conservation Management Plans and mitigation projects, especially for deficits less than 0.25 MGD.
  - Seventeen subwatersheds have deficits above 1 MGD, primarily driven by depletive water uses. Deficits of this size and cause will be more difficult and perhaps impossible to address without a major infrastructure project. However, in some cases the infrastructure project could involve a concerted recharge enhancement effort, rather than a new reservoir or importation of water. At any rate, a conditional water availability of less than 0.025 MGD (the norm) represents a very limited use compared to the water availability deficit, and even more limited compared to total water use. In such situations, project-specific mitigation will not affect the deficit much at all in any direction. Within existing water supply service areas for major public systems, the impacts of new development may not even be noticeable relative to total system use. True deficit reduction will require implementation of Water Use and Conservation Management Plans and major water resource and conservation projects. In the most severe cases, deficit elimination will require coordinated action with NJDEP. Fortunately, these areas are also identified by NJDEP as being in deficit based on the upcoming Statewide Water Supply Plan methods, and so cooperative efforts should be possible.
  - Sixteen subwatersheds have intermediate deficits, of between 0.5 and 1.0 MGD. These subwatersheds will benefit less from project-specific mitigation, and will have fewer structural options for water resources projects.

- In some cases, more detailed evaluations of the subwatersheds and their deficits may show that the subwatersheds should be managed as an aggregate unit, modifying the deficits and the feasible solutions. Where subwatersheds with major deficits are close together, creating a combined water resources project may be more appropriate than having separate projects for each subwatershed.

In summary, the smaller deficits can legitimately be resolved through a combination of project-specific mitigation, water conservation and water resource projects emphasizing recharge augmentation. The largest deficits will only be resolved through intensive water conservation and water resource projects, and the inclusion of these subwatersheds as deficit areas in the Statewide Water Supply Plan will help with the identification of those solutions. The middle-sized deficits may be the most difficult to resolve, except where they can be included within a larger sub-regional solution.

It should be noted that where a municipality is in conformance, they gain control over where the conditional water availability may be used, and they also gain access to Council funds for development of the Water Use and Conservation Management Plans.

*Where Mitigation is Infeasible*

The RMP requires that a new water use within a deficit subwatershed "shall provide mitigation equal to 125% of the proposed new consumptive or depletive water uses within the same HUC14 subwatershed…" There are several steps to this process. First, the applicant must calculate the new consumptive or depletive water use. Second, the applicant must show that conditional water availability exists that will meet the project needs. Third, the applicant must show that the mitigation can be provided within the same subwatershed. Fourth, the applicant must either include the mitigation within the project site, prove the existence of mitigation that has already occurred, or commit to implementation of the mitigation off-site within a scheduled time.

The question has been raised – what if an applicant is unable to complete any of these steps? Conditional water availability for a subwatershed may already have been used by other projects, or may be inadequate to the project. Mitigation may be deemed infeasible or financially nonviable. In any of these cases, the project should not be approved. The applicant would then need to revise the project, abandon the project, or seek a waiver based on one of the Act's provisions (e.g., public health and safety, takings, redevelopment area).