THE COMMONWEALTH OF MASSACHUSETTS

WATER RESOURCES COMMISSION

100 CAMBRIDGE STREET, BOSTON MA 02114

REPORT OF THE FINDINGS, JUSTIFICATIONS, AND DECISION OF THE WATER RESOURCES COMMISSION
Relating to the Approval of the
Town of North Reading's Request for an Interbasin Transfer
Pursuant to M.G.L. Chapter 21 § 8C

DECISION

On August 13, 2020, by a nine to zero (9-0) vote, with one abstention, the Massachusetts Water Resources Commission (WRC) approved the Town of North Reading's request for an Interbasin Transfer to purchase water from the Town of Andover. This vote was taken after review of the facts provided by the applicant, analysis of the associated data, and consideration of comments received concerning this proposal.

INTRODUCTION

North Reading has historically purchased up to 1.5 million gallons per day (MGD) of water from Andover through an existing Interbasin Transfer Act (ITA) approval granted by the WRC in 1991 for 1.0 MGD and a grandfathered amount of 0.5 MGD since 1958. In 2016, the WRC received a request from North Reading for approval of an action to increase the present rate of interbasin transfer under the ITA (M.G.L. Chapter 21 §§ 8B-8D) as part of a Draft Environmental Impact Report (DEIR) submitted to the Massachusetts Environmental Policy Act (MEPA) office. The DEIR proposed a water supply transfer through an interconnection to the Massachusetts Water Resources Authority (MWRA) and a wastewater transfer. In 2018, North Reading filed a Notice of Project Change (NPC) which modified the proposal to purchase an additional 1.5 MGD from Andover instead of the MWRA (for a total of 3.0 MGD maximum day demand) to replace existing sources. The NPC also indicated that the wastewater disposal alternative had not advanced and further study was necessary; this request was postponed to a future date, requiring the filing of another NPC with MEPA.

The Final EIR was submitted in February 2020. Additional information was requested by the WRC and received in April 2020. The Secretary's Certificate on the FEIR was issued on April 3, 2020. The WRC accepted North Reading's application as complete at its April 16, 2020 meeting. On April 17, 2020 North Reading entered into an Administrative Consent Order (ACO) with the Department of Environmental Protection (DEP) to stop using the West Village Water Treatment Plant, and, among other things, temporarily allow North Reading to purchase an additional 1.5 MGD of water from Andover until final WRC approval of North Reading's request.

A summary of the facts described in the application is as follows:

1. North Reading has land area in the Ipswich River basin.

2. North Reading's existing sources consist of six groundwater wells and one tubular wellfield in four locations within the town.
3. North Reading is currently purchasing up to 1.5 MGD from Andover, of which 1.0 MGD is through an existing ITA approval (WRC decision, 1991) and 0.5 MGD is grandfathered.
4. The capacity of existing sources has degraded over time and the wells can only produce approximately 60% of the permitted volume.
5. In January 2020, per- and polyfluoroalkyl substances (PFAS) were detected in North Reading's sources at levels that exceeded both DEP's Office of Research and Standards (OSRG) Guideline and DEP's proposed drinking water maximum concentration level (MCL) of 20 parts per trillion (ppt).
6. North Reading's average day demand (ADD), based on the years 2015 to 2019, has ranged from 1.26 MGD to 1.96 MGD.
7. North Reading is proposing to purchase an additional 1.5 MGD (for a total of 3.0 MGD) of water from Andover to replace its existing water supply sources.
8. Andover's sources are in the Merrimack River basin.
9. A MEPA environmental review, pursuant to M.G.L. c. 30, §§ 61-62I, was required for this proposed action. The ITA application was submitted as part of the DEIR for this project (EOEEA #14975). The NPC was submitted in 2018, and the FEIR was submitted in 2020. Additional information for ITA review was requested through the MEPA process and provided by North Reading.
10. The Secretary's Certificate on the FEIR was issued on April 3, 2020, stating that no further MEPA review was needed.
11. DEP and North Reading entered into an ACO on April 17, 2020. The ACO required the decommissioning of the West Village Water Treatment Plant and the temporary purchase of 1.5 MGD of water from Andover until completion of the Interbasin Transfer approval process for complete reliance on Andover for North Reading's water supply.
12. Two required public hearings were held virtually via Zoom to take comment on this application, for the donor basin on May 28, 2020 and for the receiving basin on June 2, 2020. Written public comments were accepted until June 9, 2020 and none were received.
13. A draft Staff Recommendation to approve the Request was presented to the WRC on July 9, 2020.
14. A public hearing on the draft Staff Recommendation was held virtually via Zoom on July 13, 2020. Written public comments were accepted until July 20, 2020 and none were received.

EVALUATION OF THE PROPOSED INTERBASIN TRANSFER

This Interbasin Transfer application was reviewed on its own merits and is applicable solely to North Reading's purchase and use of Andover's water. The Decision is made based on facts contained in North Reading's MEPA submissions and additional information submitted at staff's request during the MEPA process. The application was evaluated against the seven Criteria outlined in the ITA regulations (313 CMR 4.09), as well as the ITA Performance Standards and with consideration of comments received from the agencies and through the public comment process.

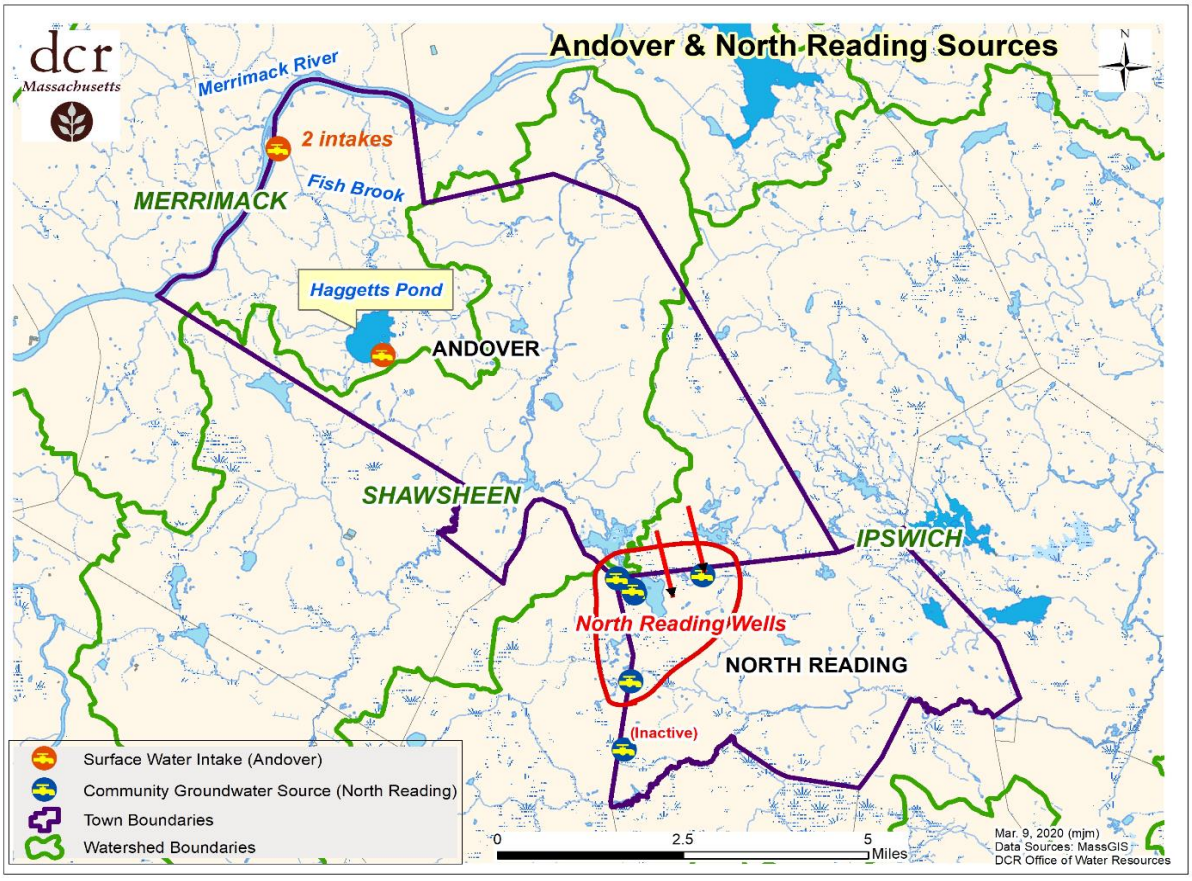
SYNOPSIS OF THE EVALUATION CRITERIA (313 CMR 4.05)

Criteria	Application Meets?
Criterion #1: MEPA Compliance	Yes
Criterion #2: Viable In-Basin Sources	Yes, with conditions
Criterion #3: Water Conservation	Yes, with conditions
Criterion #4: Forestry Management	Not Applicable
Criterion #5: Reasonable Instream Flow	Yes
Criterion #6: Impacts of Groundwater Withdrawals	Not Applicable
Criterion #7: Cumulative Impacts	Yes

BASIS FOR THE WRC DECISION

This application was reviewed by the Executive Office of Energy and Environmental Affairs (EEA), WRC staff at the DCR Office of Water Resources, DEP, and Department of Fish and Game's (DFG) Division of Fisheries and Wildlife and Division of Ecological Restoration. This Decision was made after an evaluation of North Reading's application and compliance with the five applicable Criteria of the ITA regulations and the ITA Performance Standards. The following section describes in detail compliance with the Criteria.

Figure 1: North Reading and Andover Sources



Criterion #1: Compliance with MEPA
An environmental review, pursuant to MEPA (M.G.L. c. 30, §§ 61-62I) and the MEPA regulations, 301 CMR 11.00, was required for this proposed transfer. The ITA application was submitted as part of the DEIR for this project (EOEEA #14975). The NPC was submitted in 2018, and the FEIR was submitted in February 2020. The FEIR Certificate was issued on April 3, 2020 and stated that no further MEPA review was necessary.

Criterion #2: Viable In-Basin Sources
North Reading had to demonstrate that it has made all reasonable efforts to identify and develop all viable sources in the receiving area. Because of its 1991 review of North Reading's ITA request to purchase water from Andover, the WRC is aware of the lack of viable sources in North Reading and the surrounding in-basin area. Since 1991, many studies of the Ipswich River basin have been conducted (some funded by the WRC) that support the need for supplementing water supply with an out-of-basin source. In 1991, the WRC concluded that North Reading had made all reasonable efforts to identify and develop all viable sources in the receiving area of that proposed interbasin transfer. North Reading has since conducted further studies to investigate the development and expansion of water sources within the town and basin, but found none. The WRC knows of no additional viable in-basin water supply sources having become available since that time. Following is a summary of all issues considered relating to viability.

Existing Wells
The Town's four permitted groundwater sources consist of the following: three wells at Lakeside Boulevard, one well at the Route 125 site, a tubular wellfield at Central Street and two Railroad Bed wells. North Reading's existing sources have degraded significantly over time and now are only capable of producing approximately 60% of the permitted volume. The Central Street tubular wells are producing less than 25% of their original capacity. Each of the Town's wells has been rehabilitated numerous times over their lifetime. Recent attempts to restore the capacity of the wells have been unsuccessful.

The Lakeside Boulevard wellfield and Route 125 well are the largest combined supply owned by the Town. The Lakeside Boulevard wellfield has three wells (wells #2, #3, and #4). The combined authorized rate from Lakeside Boulevard wells #2, #3, and #4 is 0.9 MGD. The Route 125 well is located along the North Reading/Andover town line. This well currently produces and is permitted for a maximum withdrawal rate of 0.189 MGD. The Lakeside Water Treatment Plant treats water from the Lakeside Boulevard and Route 125 wells. It was constructed in 1980 and is designed to remove naturally occurring iron and manganese from these wells. The system is rated for a peak flow of 0.9 MGD. However, North Reading reports that the plant can only produce about 0.3 MGD or finished water quality becomes compromised.

The Central Street Wellfield and Pump Station consist of a well point groundwater system and a pump station. The wellfield and pump station was the original source for North Reading and was constructed in 1954. Water from the 8-inch Andover connection is blended at the station with the groundwater. The wellfield is permitted for a maximum of 0.40 MGD, but currently the Town is only able to pump approximately 0.07 - 0.08 MGD because the well points have become clogged and some of the screens have indications of failure.

The Railroad Bed wellfield consists of two wells. The wells were originally constructed in 1981 following the contamination of the Stickney wellfield. The Railroad Bed supply was originally intended to be a temporary source until a more permanent supply could be identified. However, the wells have remained in service since being activated. The West Village Water Treatment Plant was constructed in 1999 and is designed to remove iron and manganese from the Railroad Bed wells. The system is rated for a peak flow of 0.5 MGD and 0.4 MGD per month. However, North Reading reports that the system is limited to a maximum output of 0.3 MGD or water quality becomes compromised.

Alternatives Analysis
The Alternatives Analysis outlined in the DEIR looked at both groundwater and surface water alternatives in North Reading and also examined a "No Build" scenario.

The "No Build" alternative evaluated impacts associated with maintaining the status quo, i.e., current groundwater withdrawals from town wells and water purchased from the Town of Andover. The no-build alternative is not a viable option for the Town due to deteriorating water quality and increased treatment costs, as well as the need to replace the aging water supply infrastructure, at significant expense. Further, neither increased costs for operational improvements nor a significant capital investment in buildings and equipment would restore capacity of the groundwater sources. DEP as well as the Town in their FEIR note that the Town's groundwater sources have degraded significantly and are now producing only 60 percent of the permitted volume. The Town's wells have been rehabilitated on numerous occasions and recent attempts at increasing their capacity have not been successful. In addition, they are highly susceptible to contamination, and recent samples indicated levels of PFAS at just above DEP's proposed MCL at the West Village Water Treatment Plant, and below the MCL at the Lakeside Water Treatment Plant. Testing performed on Andover's drinking water showed that it has a finished water average of 3.77 ppt for the six PFAS compounds which is well below DEP's proposed MCL.

Existing Interconnections
North Reading maintains hard piped inactive emergency interconnections with the neighboring communities of Middleton, Reading, Wilmington (two) and Lynnfield (two). These connections are rarely used. The connecting communities operate at lower pressures, so the use of the connections requires temporary booster pumps to be installed.

MWRA
The ENF and DEIR identified the MWRA water system, through the Town of Reading, as the preferred alternative for North Reading. This would have required improvements to both North Reading and Reading's water distribution systems, including enlarging, cleaning and lining water mains; increasing inlet and outlet pipe sizes from the Auburn Street Tank; and constructing a new water booster pump station. This alternative was later rejected by the Town in the NPC in favor of Andover since North Reading already receives water from Andover and improvements to North Reading's infrastructure would cost significantly less compared to connecting to the MWRA system through the Town of Reading.

Development of new in-town water supply sources
The Alternatives Analysis outlined in the DEIR considered various source alternatives within the town, including additional groundwater and surface water withdrawals. These alternatives were dismissed because of Water Management Act (WMA) withdrawal restrictions and high levels of flow stress in the Ipswich River basin. Added stress to the basin from increased groundwater withdrawals would have significant environmental impacts and may impact neighboring communities' ability to withdraw water from the basin to serve their residents.

For groundwater sources, a hydrogeologic zone delineation for municipal water supply wells was completed in 1996 by CDM for the Town. In the report it states that "in 1989, recognizing that existing and potential groundwater supplies were inadequate and that approvals to construct a surface water reservoir were unlikely to be obtained, the Town initiated work on expanding the Andover connection". In the intervening time period, the development of new water supply sources has only become more regulated and increasingly difficult. Therefore, no new groundwater sources within North Reading were explored.

Surface water withdrawals were dismissed because waterbodies within the town were considered impaired and, in some cases, serve as backup water supplies for other communities. Such withdrawals would also impact the Ipswich River. The Ipswich River is one of the most flow-depleted rivers in the state with low- to no-flow conditions in many reaches of the river during the summer months and during times of precipitation deficits. In addition, cumulative groundwater withdrawals substantially decrease the magnitude, and increase the duration and frequency of, low flows in the Ipswich River (see USGS study: "A Precipitation-Runoff Model for Analysis of the Effects of Water Withdrawals on Streamflow, Ipswich River Basin, Massachusetts" [Zarriello and Ries, 2000, Water-Resources Investigation Report 00-4029]).

Further, the new requirements of the WMA, issued pursuant to the Sustainable Water Management Initiative framework and guidelines and administered by DEP, will make it more difficult to obtain the quantity of water supply, above its current registered amount, that the Town needs to meet the public health and safety needs of its residents. It is highly unlikely that DEP would permit new wells in this already impacted basin. The WRC strongly encourages and supports all efforts to minimize or eliminate further withdrawals from the Ipswich River basin and all strategies to bring water back to and increase recharge within the basin. By purchasing water from Andover, the WRC acknowledges that water from out of basin will be discharged in the Ipswich River basin through local septic systems. However, the WRC also recognizes that if North Reading at a future date moves forward with its wastewater collection system as proposed in their ENF and DEIR and connects to the Greater Lawrence Sanitary District, a significant portion of the wastewater will move back to the Merrimack River basin for disposal.

Water Quality Issues
When considering developing new water supply sources, water quality is also of concern. If the new sources would be located in existing wellfields, the reliability of these sources cannot be guaranteed. Water quality has declined since 1993, creating water that is more difficult to treat. In addition to water supply capacity issues and low flows in the Ipswich River, potential contamination is an issue. A number of oil and hazardous waste release sites, reported toxic

chemical spills and other accidents, and underground storage tanks are located in Zone II protection areas in the town. Therefore, local sources are susceptible to contamination.

Future Plan for Use of Wells
The DEIR stated (page 9-39) that the recommended plan requires the formal decommissioning of North Reading's local sources and the forfeiture of the existing withdrawal registration. However, in the FEIR, North Reading stated that upon transitioning to the Town of Andover's water supply, North Reading will not forfeit their registration but maintain their local water supply wells for emergency supply purposes when an emergency is declared by DEP, i.e., their local supplies will no longer be used on an ongoing basis. North Reading will abandon the Central Street wellfield and demolish the pump station, but keep their other wells active and physically disconnect them from the distribution system. The Town plans to run the wells two times a year to verify capacity and function. Land surrounding the wells will continue to be protected for water supply protection. Two years after the connection with Andover, North Reading intends to decommission both their treatment facilities, the Lakeside and West Village Water Treatment Plants.

As a result of the above analyses and considerations, North Reading is proposing to discontinue withdrawal of water from the Ipswich River basin and obtain all of its water supply from Andover in the Merrimack River basin. Through the ACO, entered into with DEP on April 17, 2020, North Reading has been ordered to decommission their water treatment plants, and discontinue the use of their local sources, converting them from inactive to emergency status.

In conclusion, the basic requirements of the ITA is that local water supply sources are used to the maximum extent possible prior to obtaining permission to transfer water from out of basin. However, given all of the above described conditions, coupled with the well documented flow-depleted condition of the Ipswich River basin, the WRC determined that all reasonable efforts have been made to identify and develop all viable sources in the receiving area of the proposed interbasin transfer.

Criterion #3: Water Conservation
North Reading had to demonstrate that all practical measures to conserve water have been taken. The Town has had water conservation-oriented actions in place for many years to help reduce residential water use. The focus has been directed to public education and outreach, a meter replacement program, an outdoor water restriction bylaw, a rain barrel program, and an increasing block water rate structure.

The WRC water conservation performance standards are numbered below, followed by a bulleted narrative of North Reading's actions.

1) A full leak detection survey should have been completed within the previous two years of the application. The proponent should provide documentation regarding repair of leaks identified during the survey.

- Leak detection is conducted every two years; the last survey was completed in November to December 2019. Documentation of the survey was provided.

- All identified water main and hydrant leaks were repaired; the Town is continuing to resolve service leaks.

2) The water supply system should be 100% metered, including public facilities served by the proponent. A program of meter repair and/or replacement must be in place. Documentation of annual calibration of master meters and a description of the calibration program should be included in the application.

- Master Meters: Properly calibrated and properly installed master meters provide reliable and accurate data that is used to compare to consumption data and to understand the degree of unaccounted-for water (UAW) in a system. In 2015-2016, North Reading's engineering consultant, Wright-Pierce, conducted a master meter study that evaluated the installation, sizing, accuracy, and applicability of each of the Town's 11 master meters. The study found that many improvements were needed, and all of the meters should be calibrated yearly. The project to fully connect with Andover will include the replacement of the two interconnection master meters. In addition, as the existing treatment facilities and groundwater sources are taken out of service, the master meters associated with those facilities will be retired. Within two years of connecting fully to Andover, the Town will only have the two replaced interconnection master meters remaining in the system.
- New Customer Meters and Advanced Metering Infrastructure (AMI): The Town of North Reading has invested $1.7 million to replace all customer meters and upgrade the meter reading equipment with an AMI System. These two improvements will provide more accurate meters and more reliable and timely data.
- North Reading is 100% metered including all public buildings.
- Documentation of calibration history and testing results for master meters was provided, and meters are sealed.

3) UAW should be 10% or less. The proponent should provide documentation of UAW, in both gallons and percentage of the total finished water entering the distribution system, for each of the past five years. The definition of accounted-for and UAW for use in Interbasin Transfer applications is given in Appendix C of the Performance Standards.

- According to data obtained from DEP, North Reading's 5-year UAW average from 2014-2018 is 18%. This percentage reflects UAW without the submittal of Confidently Estimated Municipal Use (CEMU) documentation. Over the past few years, the Town has been working steadily to meet the Performance Standard for UAW. In addition to leak detection and repair, North Reading has been addressing high UAW by improving its accounting of water and has implemented projects for both master meters and customer meters, as discussed above.
- The new AMI system, in combination with the two new interconnection master meters, is expected to greatly improve water use accounting and reduce UAW. Town-wide water system audits are a best management practice to account for all water uses and losses and to better inform the development and implementation of water loss control programs. Accurate metering data are key to the value of a water audit. The FEIR states that "The Town of North Reading has deferred the completion of a town-wide water audit until the completion of the ongoing AMI meter replacement program." As of January 2020, the AMI system is complete, and the Town has replaced 98% of its customer meters with

new meters. It will take 1-2 years to collect new water information before the Town can reassess the impacts and benefits to UAW use.

- North Reading must complete conditions related to water audits, CEMU documentation, and a water loss control program as described in the "Conditions" section to address 10% UAW.

4) The proponent should provide documentation to show that there are sufficient sources of funding to maintain the system, including covering the costs of operation, proper maintenance, proposed capital improvements, and water conservation. The rate structure must encourage water conservation.

- Year-to-year expenses are covered by a combination of: a) water rates; b) annual charges for fire protection infrastructure on private property; c) fees for new development hookups and repair/service calls; and d) fines. Large capital expenses are generally bonded. Capital expenses associated with the current ITA proposal will be bonded and use grant monies. Revenues have been sufficient to build up a substantial reserve fund to assist with revenue stability, emergency infrastructure needs, rate increase mitigation (allowing rates to increase at a slower pace), and other unanticipated costs. Short- and long-term budgeting together account for operation, maintenance, debt service, capital costs, source protection, and water conservation. The water department is funded through an Enterprise account, which ensures water revenues are dedicated to water supply system uses.
- The water department uses a 3-tier increasing block rate, with no base allowance, so every gallon has a cost. The sizing of the tiers was based on thoughtful analysis and the percentages of customers charged at the different tiers demonstrate the tiers are helping to target higher users effectively, especially in the summer. The department's rates also send a strong overall conservation signal. Volumetric charges for usage at 65 gallons per capita per day (gpcd, the state year-round residential standard), are in the top 10th percentile among Massachusetts water suppliers. Additionally, the Massachusetts Water and Wastewater Rates Dashboard developed by the UNC Environmental Science Center, which incorporates a different set of assumptions, shows North Reading's total water charges (fixed and volumetric) to be relatively high among Massachusetts suppliers for a wide range of household water use. The dashboard also shows the department's "conservation signal" for monthly usage to be near the top among Massachusetts suppliers, based on the price per gallon over 10,000.

5) The proponent should bill its customers at least quarterly based on actual meter readings. Bills should be easily understandable to the customer (e.g., providing water use in gallons and including comparison of the previous year's use for the same period).

- Bills are quarterly and based on actual meter readings. Units are gallons. Customers have access through an online portal to detailed tracking of water use (in 1-hour increments), comparisons of season-to-season changes and year-over-year changes, and water conservation tips. The water department tracks usage patterns and sends letters to customers whose use suggests they may have a leak.
- All water supply sources (including purchased and sold) are metered.

6) A drought/emergency contingency plan, as described in 313 CMR 4.02, should be in place. This plan should include seasonal use guidelines and measures for voluntary and mandatory water use restrictions and describe how these will be implemented. There should be a mechanism in place to tie water use restrictions to streamflow and/or surface water levels in the affected basin(s) where this information is available.

- North Reading has a comprehensive drought plan that meets this standard, but it will need to be updated to reflect a change in water supply source from the Ipswich River basin to Andover's sources in the Merrimack River basin. Since North Reading already purchases water from Andover, the current plan already includes considerable information about Andover's system. Additionally, when updating their drought plan North Reading should review the 2019 Massachusetts Drought Management Plan and incorporate applicable recommended elements from the state plan into their local plan. It should also incorporate conditions that tie the local plan to drought declarations and any recommended actions by the Secretary of EEA for the Northeast Region.

7) All government and other public buildings under the control of the proponent should have been retrofit with water saving devices.

- North Reading completed an audit of Public Building Water Use in December of 2014. The audit identified short- and long-term retrofit projects. The improvements will be completed in phases, and North Reading appropriated $26,000 for the first phase of improvements at the June 2016 town meeting.
- After review of information provided in the DEIR on the Town's retrofit program, it was determined that there is an ongoing program which meets the intent of this standard.

8) If the community's residential gallons per capita per day (rgpcd) is greater than 65, the proponent should be implementing a comprehensive residential conservation program that seeks to reduce residential water use.

- North Reading's rgpcd has ranged from 61 to 70 over the past 7 years (2012-2018) with an average of 68. It has been above 65 for all but one of those years. The Town has recently completed several initiatives (AMI system and Water Smart Software) that should facilitate the implementation of a more focused residential conservation program. The new systems will help the Town to identify use patterns throughout the town; to target accounts with high usage or that exhibit signs of leaks; to monitor compliance with watering restrictions; and to bring their rgpcd below 65. The system's customer portal allows residential and commercial customers to view their water consumption history, to set water consumption and billing thresholds for notification of suspected leaks and unusually high usage, and to receive information on reducing their water consumption. In addition, the Town has indicated that the more frequent and discrete level of data available through the new metering system will facilitate the expansion of its public education and outreach plan.

9) A broad-based public education program, which attempts to reach every user at least two times per year, through such means as mailings, billboards, newspaper articles, cable television announcements or programs, or the use of other media, should be in place.

- Review of the Town's outreach materials and program provided in the DEIR and on their website indicated an ongoing public outreach program. Moving forward, North Reading

must use the AMI system and data to focus the Town's resources in the most efficient manner, and to expand its Public Education and Outreach program using the more frequent meter readings and discrete level of data available through the new AMI system.

10) A program which identifies and ranks all industrial, commercial and institutional (ICI) customers according to amount of use, and requires regular contact with the largest users to promote water conservation, should be in place. Materials on water reuse and recirculation techniques should be provided, where appropriate.

- North Reading is primarily a residential town; therefore this standard is largely not applicable. While a program directed at ICI is not applicable, North Reading's new AMI system will allow them to evaluate water use and develop water saving strategies with large users of any type, including ICI customers.

11) A program of land use controls to protect existing water supply sources of the receiving area that meets the requirements of DEP should be in place.

- Records provided by DEP confirm that the Town of North Reading has adopted the following protection controls:
    - Town of North Reading, Aquifer Protection District Bylaw, 1995 as amended
    - Town of North Reading Aquifer Protection District Overlay, 1995 as amended
    - Town of North Reading Board of Health Floor Drain Regulation, 2003

  These controls meet DEP's Groundwater Supply Protection Regulations 310 CMR 22.21(2) and fully cover the Zone II of North Reading's wells.

12) There should be a long-term water conservation program, which conforms with the 2018 Water Conservation Standards for the Commonwealth of Massachusetts and is informed by analysis of North Reading's water use data. The program should include but not be limited to an indoor and outdoor component, a water loss control program, and the development of water rates that provide incentives for water efficiency. The program should also include a public outreach and education component. The program should be documented in written form and updated regularly or at a minimum after each significant drought event.

- Review of North Reading's Water Conservation website, in addition to the information evaluated above in performance standards 1 through 10, indicated that this standard is largely met, except for additional outreach informed by AMI data, and a water loss control program including annual audits, both of which are specified as conditions in this Decision.

Notwithstanding the above assessment, the WRC recognizes that in certain cases, local conditions may prevent a proponent from meeting or exceeding the "yardstick" that has been described in ITA guidance, even after a substantial effort has been made. In these cases, the proponent should explain why that standard cannot be met, demonstrate an alternate method of meeting the intent of the standard, and document any efforts that have been undertaken in order to comply with the standard. Therefore, the standards are presented as presumptions that can be rebutted in cases where local conditions or other extenuating circumstances must be taken into consideration.

Summary of Water Conservation Criterion
Based on the information evaluated in performance standards 1 through 12 above, the WRC finds that the water conservation Criterion of the ITA will be met upon implementation of conditions.

Criterion #4: Forestry Management Program
This Criterion requires that a comprehensive forestry management program has been implemented on any watershed lands with surface water sources serving the receiving area (North Reading) and under the control of the receiving area. All of North Reading's sources are groundwater sources. This Criterion is not applicable to this proposal.

Criterion #5: Reasonable Instream Flow and Criterion #7: Cumulative Impacts
North Reading is proposing to purchase up to an additional 1.5 MGD of water from Andover. System hydraulics and the maximum interbasin transfer amount requested will result in a maximum transfer of 3.0 MGD. The Town proposes to cease operation of its Ipswich River basin wells and rely completely on the Merrimack River basin for its water supply.

Criterion #5 requires that reasonable instream flow in the river from which the water is transferred is maintained. The impacts of transferring an additional volume of 1.5 MGD from the Merrimack River were evaluated. In addition, per Criterion #7 the WRC must consider the "cumulative impacts of all past, authorized or proposed transfers on streamflows, groundwater, lakes, ponds, reservoirs or other impoundments in the Donor Basin and relevant sub-basins". Accordingly, the impact of transferring an additional 1.5 MGD and the cumulative impact of transferring 3.0 MGD from the Merrimack River were evaluated.

The WRC relied on data and information provided in the North Reading FEIR, information submitted by the project proponent, information provided through U.S. Geological Survey National Water Information System and StreamStats, and previous WRC decisions.

Andover Water Supply
The Town of Andover obtains water from Haggetts Pond, Fish Brook, and the Merrimack River and is currently authorized to withdraw from the Merrimack River basin with its WMA registration and permit. Andover's permitted volume is greater than the projected Andover water demand and the additional North Reading purchase combined.

The intake for Andover's Water Treatment Plant is located on Haggetts Pond. Haggetts Pond has a safe yield of 1.1 MGD and is supplemented by water pumped from Fish Brook (a tributary to the Merrimack River) and the Merrimack River. Haggetts Pond is full at elevation 117.6 feet. In order for the raw water pumps to stay submerged, the pond's elevation is not allowed to drop below 113.5 feet. When the elevation of Haggetts Pond drops to a level of 116.5 feet, Fish Brook Pump Station, about 2.5 miles away, is activated to replenish the pond through a 36" pipe. Once the water level in Haggetts Pond is full again (the level reaches 117.6 feet), Fish Brook Pump Station is shut off. At 117.6 feet, Haggetts Pond spills into the Fish Brook watershed.

Fish Brook Pump Station, built in 1965, withdraws water from an impoundment of Fish Brook at the Merrimack River. The water level in the Fish Brook impoundment must be kept near the top

of the dam (12-13 feet) for operation of the Fish Brook Pump Station pumps. When flows from Fish Brook are insufficient to keep the impoundment full for operation of the pumps, water from the Merrimack River is pumped over the dam via a submersible pump to maintain the 12-13 foot water level in the impoundment. Andover typically operates the Fish Brook Pumping Station to pump and fill Haggetts Pond continuously between March and December of each year. However, the pumping duration can vary depending on weather and demand. The water level required for the operation of the pumps also maintains flow over the fish ladder from the impoundment to the Merrimack River. While maintaining the fish ladder is not part of Andover's normal operating procedures, by maintaining 12-13 feet in the impoundment in order to operate the pumps, flows are maintained in the fish ladder.

Existing operating levels of Haggetts Pond and the Fish Brook Pump Station will remain the same with the increased transfer to North Reading. Because the safe yield of Haggetts Pond is only 1.1 MGD, the proposed increase for North Reading would result in additional withdrawals from the Merrimack River. Thus, the Merrimack River at Fish Brook was used for the hydrologic analysis below.

Hydrologic Analysis

Historical streamflow data showing the impact of the proposed transfer on the donor river basin was evaluated. The incremental amount of 1.5 MGD was analyzed in addition to the cumulative amount of 3.0 MGD (0.5 grandfathered from 1958 plus 1.0 MGD approved in 1991 plus the current proposed amount). Data from USGS gage 01100000 Merrimack River below Concord River at Lowell, which is upstream of the Andover intake, was used. The drainage area above the gage (4,635 square miles) is slightly less than the drainage area of the Merrimack River at Fish Brook (approximate 4,650 square miles), resulting in a slightly conservative analysis.

Drought and Low Flows

Three periods with droughts were chosen: 1962 -1966 (including the drought of record); 1979-1984; and 2016-2017. Table 1 shows the historical minimum daily flows during these time periods and the percentage of the proposed and cumulative transfers. At the minimum flow of 214 cubic feet per second (cfs) during the 1960's drought of record, the increase of 1.5 MGD max day flow (2.32 cfs) to North Reading is only 1% of the minimum flow of the Merrimack River. The cumulative impact of 3.0 MGD max day (4.64 cfs) is 2.2% of the minimum.

Table 1

Data	1962-1966	1979-1984	2016-2017
Minimum daily flow, cubic feet per second (cfs)	214	323	695
% of Minimum, 1.5 MGD	1%	0.7%	0.3%
% of Minimum, 3.0 MGD (cumulative impact)	2.2%	1.4%	0.7%

ITA Criteria require evaluating impacts of the transfer on specific low flow statistics. The project proponent submitted an analysis of the 95% Exceedance Flow calculated using 2010 to 2020 streamflow data. The proposed transfer is 0.17% of the 95% Exceedance Flow (1,370 cfs) and the cumulative transfer is 0.34%. Analysis of the entire period of record (1923 to 2020) also

shows similar results: 0.18% and 0.37% of the 95% Exceedance Flow (1,270 cfs) for the proposed and cumulative transfers, respectively.

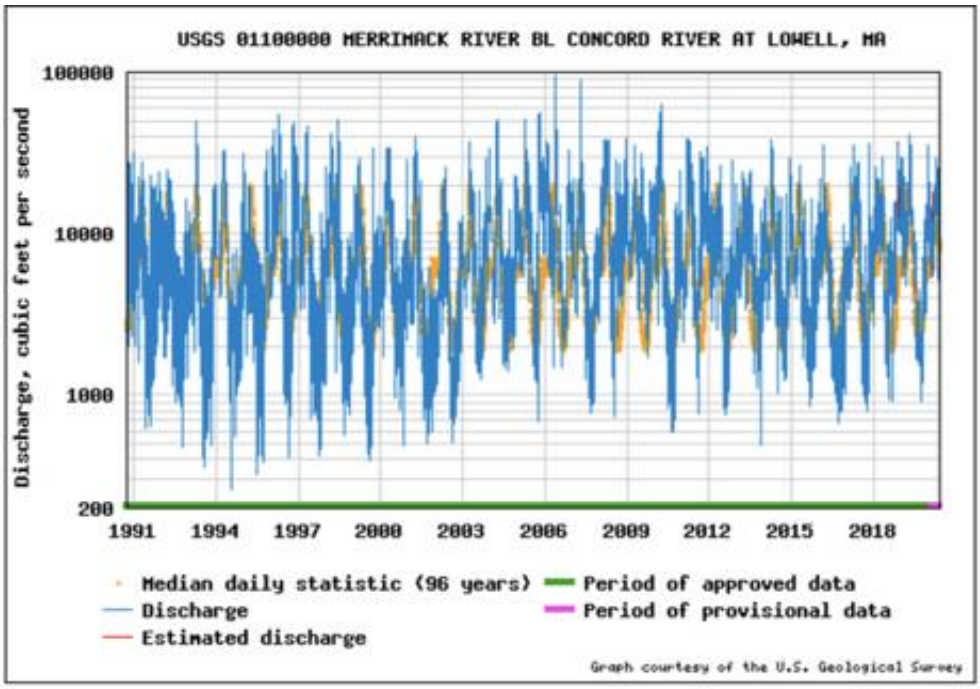
7Q10 flows were evaluated for the wastewater treatment plants (WWTPs) located downstream of Andover's intake location. These WWTPs include: Greater Lawrence Sanitary District (GLSD), Haverhill Wastewater Treatment Plant, Merrimac Wastewater Treatment Plant, and Amesbury Wastewater Treatment Plant. Table 2 includes the 7Q10 flows for the facilities and the percentage of the flow that is proposed to be transferred to North Reading. Based on this analysis, there will be no impacts to wastewater facilities downstream or their dilution factors and permits.

Table 2

North Reading Withdrawal Percentages of 7Q10 Flows Merrimack River in cubic feet per second (cfs)				
WWTP	GLSD	Haverhill	Merrimac	Amesbury
7Q10 Flows	832	878	611	900
% of 7Q10 Flows, 1.5 MGD	0.28%	0.26%	0.38%	0.26%
% of 7Q10 Flows, 3.0 MGD (cumulative impact)	0.56%	0.53%	0.76%	0.52%

Intermediate Flows and Flood Flows

The Merrimack River is a very large river compared to the proposed transfer. A hydrograph of the daily mean discharge since 1991, the year of the previous WRC ITA approval, is provided to illustrate this. Given the size of the Merrimack River, the proposed transfer of 1.5 MGD (2.32 cfs) will not impact the intermediate flows and duration, and frequency or magnitude of high and flood flows. The natural variability of the Merrimack River will not be affected by the proposed transfer of 1.5 MGD or the cumulative transfer of 3.0 MGD.



Impacts to Other Uses

Fisheries

The proposed transfer to North Reading will have no effect on indigenous or anadromous fisheries. There are coldwater fisheries located downstream of Andover's withdrawal location in the Merrimack River such as: Cottles Creek in Haverhill, Cobbler Brook in Merrimac, and Presbus Creek in Amesbury. Based on the small percentage of flows requested to be transferred even during historical drought conditions, there will be no effects on indigenous and anadromous fisheries.

Effects on Rare and Endangered Species

Andover's water source is Haggetts Pond, which receives most of its water from the Merrimack River through an impoundment of Fish Brook. The Merrimack River is mapped with state-listed rare species protected under the U.S. Endangered Species Act implemented by the National Marine Fisheries Service. A comment letter received from Massachusetts Division of Fisheries and Wildlife and included in the NPC Certificate indicated that based on their understanding of the project and the species identified in the project scope, the interbasin transfer should not result in impacts to state-listed species.

Hydropower

The 1991 WRC decision stated that Lawrence Hydroelectric Associates (now known as Enel Green Power) is required under its Federal Energy Regulatory Commission (FERC) License to release 951 cfs unless and until the water level is drawn down below the crest of the Lawrence Dam, in which case the required minimum release would be equal to the inflow. Andover does not continuously monitor the stream gage and has never been notified by Enel or any other

licensee of the FERC License to restrict withdrawal from the Merrimack River due to their release restriction at the Lawrence Dam. With the proposed transfer of 2.32 cfs, cumulative transfer of 4.64 cfs, and the net impact to the Merrimack River of less than 2.2% even under the drought of record, there will be no impact to Enel's operations from the proposed transfer.

Other Instream Uses
In addition, there will be no effects on water quality, recreational uses, or aesthetic values. There are no perceptible effects on the reservoirs, river hydrology and any adjacent wetlands or dependent flora anticipated. The increase in transfer for North Reading will have no effect on existing or planned uses of the Merrimack River.

Summary of Reasonable Instream Flow Analysis and Cumulative Impacts
Low, intermediate, and high flows will not be impacted. Current resources will be unaffected by the transfer. The proposed transfer will still maintain reasonable instream flow in the donor basin.

Criterion #6: Impacts of Groundwater Withdrawals
Andover's sources are surface water sources. This Criterion is not applicable to this proposal.

OTHER ISSUES CONSIDERED

The Ipswich River has a history of low flow conditions. Natural fluctuations in flow, water withdrawals, and wastewater exports all contribute to this condition. Reducing withdrawals within the basin, whether groundwater or surface water, is expected to benefit and improve streamflow and habitats that rely on streamflow within the basin. It is anticipated that North Reading terminating its ongoing reliance on local sources will result in a net increase of 1.1 MGD into the Ipswich River basin.

EXECUTIVE ORDER 385

This Decision is consistent with Executive Order 385, which has the dual objective of resource protection and sustainable development. This Decision does not encourage growth in areas without adequate infrastructure nor does it cause a loss of environmental quality or resources.

CONDITIONS FOR APPROVAL

Based on the analyses of this project, the approval of North Reading's application under the ITA to purchase additional water from Andover is subject to the following conditions. **North Reading must commit in writing within 45 days of the approval to abide by all conditions required by the approval of this transfer.**

1. North Reading will abandon the Central Street wellfield, demolish the pump station, and keep their other wells active while physically disconnecting them from the distribution system. The Town will run the wells two times a year to verify capacity and function and maintain them only as an emergency backup, as declared by DEP. The land surrounding all the wells will continue to be protected for water supply protection. Within two years

of the connection with Andover, North Reading will decommission both their treatment facilities, the Lakeside and West Village Water Treatment Plants.

2. North Reading must limit its purchase of water from the Town of Andover to 3.0 MGD and continue to submit Annual Statistical Reports to DEP each year. WRC staff will review the reports to confirm that the interbasin transfer from Andover to North Reading does not exceed 3.0 MGD and to determine if the programs in place have the water conservation conditions outlined in this Decision, and are successful in keeping UAW at or below 10% and rgpcd at or below 65.

3. Within thirty (30) days following approval of this Interbasin Transfer, North Reading shall submit to DEP for its review and approval a detailed plan and implementation schedule to address, at a minimum:
    a. the decommissioning of North Reading's Lakeside and West Village Water Treatment Plants, and conversion of all existing water supply sources from inactive status to emergency status (in accordance with the Drinking Water Regulations at 310 CMR 22.00 for use only in the event of a DEP-declared emergency);
    b. actions necessary to maintain the capacity to provide water from its existing water supply sources only in the event of an emergency, including the ability to provide disinfection;
    c. maintaining or improving its ownership or control of the Zone I for its wells in accordance with the Drinking Water Regulations at 310 CMR 22.00; and
    d. maintaining or improving its Zone II wellhead protection in accordance with the Drinking Water Regulations at 310 CMR 22.00.

4. North Reading must seek WRC approval prior to making any changes to their water use restriction bylaw that would make it less environmentally protective than the current restrictions.

5. North Reading must continue its ongoing water conservation efforts. To reduce the per capita residential water use to 65 gpd or below, North Reading must enhance its residential conservation program by using the AMI system and data to focus the Town's resources in the most efficient manner to expand its Public Education and Outreach program using the more frequent meter readings and discrete level of data that is available through the new AMI system. The AMI system and data must also be used to focus the Town's ICI sector water use reduction efforts.

6. With UAW greater than 10%, North Reading must:
    a. Complete annual American Water Works Association Level 1 validated M36 water audits. Validation should be done by a qualified person. If there are data validity issues, North Reading should take steps to consistently improve its data.
    b. Submit to the WRC documentation that an annual M36 water audit has been completed.
    c. Document CEMU. Record keeping and CEMU documentation will also help with M36 water audits.

d. Develop and implement a Water Loss Control Program in accordance with standard industry best management practices. The intent is to use the annual M36 audits (after approximately 5 years of audits) to help inform the selection of water loss strategies best suited for North Reading. Elements of a Water Loss Control Program can be found in the 2018 Water Conservation Standards and EPA guidance. Water Loss Control Strategies can be found in the AWWA guidance associated with M36 Audits as well as EPA guidance.
e. Provide annual summaries of progress and make all documents available upon request to WRC staff for review.

7. North Reading must update its water conservation plan and program to reflect the additional components outlined in conditions 5 and 6.

8. In the event that North Reading's local sources become viable in the future, North Reading must notify the WRC for consideration of the implications of in-basin water availability on this approval. In addition, North Reading must notify the WRC of any system changes, including those in infrastructure or operation, which could provide the Town the ability to increase its rate of interbasin transfer. By virtue of claiming that its local sources are currently not viable at any time for drinking water purposes, and therefore an Interbasin Transfer from the Merrimack River basin is needed to meet the Town's water supply needs, under the ITA North Reading will have the ability to use its local sources only under a DEP-declared emergency.

9. North Reading must update its Drought Management Plan to reflect a full transfer to Andover's sources of water. The updated plan should: include seasonal drought management strategies, review and incorporate elements from the 2019 Massachusetts Drought Management Plan, and tie the local plan to regional drought declarations and recommendations for drought mitigation actions by the Secretary of EEA.