FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS)

Department of Natural Resources (DNR)

Region or Bureau
Bureau of Drinking Water and Groundwater

NOTE TO REVIEWERS: This document is a DNR draft environmental impact statement (dEIS) that evaluates probable environmental effects. Your comments should address the completeness and accuracy of the dEIS. For your comments to be considered, they must be received by the contact person before 4:30 p.m., July 14, 2014.

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Title of Proposal: High Capacity Well – Fort McCoy water supply system

Location: County: Monroe City/Town/Village: Greenfield Township

Township Range Section(s): Section 20, T18N, R2W

PROJECT SUMMARY

1. Overview

The applicant proposes constructing four high capacity wells in north central Monroe County, to reach the desired increase in water supply capacity of 400 gallons per minute (gpm). The wells will be located within the boundaries of Fort McCoy, a federal military installation (Installation) operated by the U.S. Army. The wells are intended to expand and improve the existing water supply system for the base. Each well will be constructed to a depth of approximately 200 feet and would be equipped with a pump capable of pumping 400 gallons per minute (gpm). The wells would be constructed on the southeast end of the North Post of the installation, north of US Highway 21.

2. Purpose and Need

Water from the proposed wells will be used to improve and expand the existing water supply system for the base. A 2011 Water System Evaluation identified a number of needed improvements to be addressed by the proposed expansion. Most notable of the needed improvements are an increase in reliable capacity (defined as total capacity minus capacity of the largest well) and a raw water main that does not maintain pressure. A consent order was issued by DNR in June 2013 requiring that the water system upgrade project would be completed by December 31, 2014. Population at the base ranges from 4,000 people to 20,000 people on a seasonal basis, which includes civilians and military personnel. The Installation currently reaches its maximum capacity during May-August. Projections from the Master Planning Department anticipate that the busy season will expand from May-August to April-September (See Fort McCoy Dept. of Public Works Engineering Report Section 2.4). The anticipated increase in population prompted the increase in reliable capacity and led to the need for new wells since the existing well field (total supply capacity 1950gpm, reliable capacity 1500gpm) will not meet the projected needs of the base (total supply capacity 2350gpm, reliable capacity 1900gpm). In addition to increased hydraulic requirements of the Installation, new wells are needed to replace Wells 11 and 12 which are non-compliant and Wells 22 and 23 which have pumping water levels that draw down below the existing

grouted casing, which can lead to bacterial growth.[1]

3. Authorities and Approvals

In order to construct the wells, the owner must obtain a high capacity well approval under Chapter NR 812, Wisconsin Administrative Code. Chapter NR 812 specifies detailed well construction and operation requirements. In addition, because all three of the proposed well locations are within 1,200 feet of a trout stream, the wells must also be reviewed under Ch. NR 820, Wis. Adm. Code, to determine whether they could result in significant adverse environmental impacts.

The planned well locations are within or near the existing water supply system, and no approval beyond the high capacity well approval and the public water system approval is required. Water pumped by the wells will supply the North Post water distribution system and then be sent to the fort's water treatment facility, which discharges the water to the La Crosse River under the installation's current WPDES permit (Permit number 0022420).

PROPOSED PHYSICAL CHANGES

4. Manipulation of Terrestrial Resources

The proposed wells are expected to be completed using conventional well drilling equipment and methods. Each well will be completed in sandstone and shale bedrock of the Elk Mound group, mainly the Mt. Simon formation. It is anticipated that the wells will be constructed to a depth of 200 feet below ground surface, with 10-inch diameter steel casing to a depth of 60 feet. The remaining depth of the drillhole (60-200 feet) will be an open hole in bedrock.

5. Manipulation of Aquatic Resources

The application indicates that the projected 2025 maximum daily pumping from the entire well field (including all existing and proposed wells) will be 1,800,000 gallons per day. In order to keep the system pressurized and the upper reservoir full, this maximum level of pumping would occur as needed during the season of peak demand. Average daily use over the year would be 490,000 gallons per day. Total annual water use for the water system will be 180,000,000 gallons.

6. Buildings, Treatment Units, Roads and Other Structures

The proposed wells (designated as Wells 27, 28, 29 and 30) will be located proximal to the existing well field, in the southeast corner of the North Post facility. Permanent infrastructure at the site includes numerous roads, barracks, and water treatment facilities. The water supply system includes six water supply wells, associated well houses, a low level reservoir, a high level reservoir, a chemical treatment building, a booster station and associated raw and treated water supply lines. In addition to the six potable water supply wells, there are numerous other wells on the property serving specific buildings or facilities.

Proposed Wells 27 and well 28 will be connected to existing infrastructure via pitless units at the locations of existing wells 22 and 23, respectively. Wells 22 and 23 will subsequently be abandoned, as will Wells 11 and 12. Wells 29 and 30 will include the construction of a new well house and approximately 400 feet of below-ground piping to transport water from the wells to the water treatment and delivery system.

7. Emissions and Discharges

Treated effluent from the Installation's wastewater treatment facility is discharged in the southwest region of the North Post facility to the LaCrosse River. The Installation's wastewater treatment facility has a permitted outfall that is covered under WPDES permit number 0022420, and is considered a municipal discharge. Water loss from this type of municipal water system is assumed to be 12%.

8. Other Changes

None

9. Identify the maps, plans and other descriptive material attached

Attachment 1 USGS topographic map

[1] Engineering Report: Proposed Water System Improvements.Randy Sanford, SEH. 2014.

Attachment 2 Map of Base area and Upper LaCrosse River Watershed area

Attachment 3 Water System upgrade site plan

Attachment 4 DNR webviewer map with radius of five-foot drawdown area

AFFECTED ENVIRONMENT

10. Information Based On :

☒ Literature/correspondence

Brown, B.A., 1988. Bedrock Geology West-Central Sheet. Wisconsin Geologic and Natural History Survey Map 88-7. http://wisconsingeologicalsurvey.org/pdfs/M104_web.pdf

Application for High Capacity Well Approval

http://quickfacts.census.gov/qfd/states/55/55081lk.html

Hamilton, D.A. and P.W. Seelbach, 2011. Michigan's Water Withdrawal Assessment Process and Internet Screening Tool. Michigan Department of Natural Resources. Fisheries Special Report 55, Lansing.

Lippelt, I.D., 1981. Water table Map, Monroe County, Wisconsin. WGNHS. http://wisconsingeologicalsurvey.org/pdfs/M073_web.pdf

WiscLith: A Digital Lithologic and Stratigraphic Database of Wisconsin Geology, Open File Report 2003-05, Wisconsin Geological & Natural History Survey

Hart, D., 2012. Hydrogeology of Fort McCoy Geothermal Test Hole #5. Wisconsin Geologic and Natural History Survey Report, Madison.

Sanford, R., 2014. Engineering Report: Proposed Water System Improvements, Fort McCoy, Wisconsin. Short Elliott Hendrickson Inc. No USAMC 124407, LaCrosse.

Wisconsin Well Construction Reports

☒ Personal Contacts (list in item 26)

Field Analysis By: ☒ Author ☒ Other (list in item 26)

Past Experience With Site By: ☒ Other (list in item 26)

11. Physical Environment

The proposed wells will be situated on an approximately 59,000-acre parcel owned and operated by Fort McCoy – Department of the Army. The eastern part of the property, including the proposed well locations, the treatment, storage and delivery facilities, is located within Monroe County, Greenfield Township. The western part of the property, which includes the WWTP and discharge outfall, is in Monroe County, Lafayette Township. The proposed well sites are located in the SW ¼ of Section 20 T18N R2W. The property is an active military base and training facility.

The proposed well site is within the Driftless Area of west central Wisconsin, well known for cranberry production. The landscape has a well-developed drainage system. Relief from the valley bottoms to the ridge tops is typically around 100-200 feet. Surface soils are primarily mapped as well-drained to moderately well drained sand and loamy sand in the valleys and eroded silt loams that are mapped on the ridges. The proposed wells will be constructed in a valley where the soil is primarily sand, with a depth of 5-20 feet to bedrock.

Bedrock mainly consists of Cambrian sandstone and shale overlying Precambrian granite and schist. Some ridge tops are capped with Ordovician age dolomite. The upper bedrock unit in the area of the Installation is the Prairie Du Chien Group dolomite, Oneota formation. This unit forms the caps of the uppermost ridges and is a maximum of 90 feet thick. The lower portions of the ridges (and the entirety of the smaller ridges) are composed of Cambrian sandstones of the Trempealeau Group (90-140 feet thick), Tunnel City Group (65-100 feet thick) and the Wonewoc Formation (30-80 feet thick), the upper member of the Elk Mound Group. Stream valleys and the wide plain east of the Installation are formed in Eau Claire formation and Mount Simon formation sandstone and shale. Igneous and metamorphic crystalline bedrock forms the impermeable basement rock and is found at a depth of 315 feet according to geologic logs from a geothermal well drilled at the Installation in May 2012.

Groundwater is the only source of drinking water in the area of the proposed wells. The main aquifer in the area is the Cambrian sandstone aquifer. The Installation's water supply wells draw water from the lower Cambrian sandstone units, as do residential wells in the area. The interbedded shale of the Eau Claire and Mount Simon formations can form a local aquitard and represent the only potential confining unit in the area.

The proposed wells will be completed above the shale beds previously identified in the upper Eau Claire/Mount Simon during construction of Geothermal Well 5 in the vicinity of the proposed wells. These beds are marked on the geophysical logs by high natural gamma readings and low normal resistivity. Details of the geophysical log can be found in David Hart's report titled *Hydrogeology of Fort McCoy Geothermal Test Hole 5* (pg. 4-5, 2012). Depth of shale beds was further confirmed during test drilling that occurred in October 2013.

The nearest municipal public water supply wells are those owned by the City of Tomah. The City's Well 10 is about 5.8 miles east of the proposed well site while Wells 6 and 9 are 7.3 and 7.8 miles southeast of the proposed well site, respectively. Well 10 is 251 feet deep, Well 6 is 325 feet deep, and Well 9 is 250 feet deep. The City of Sparta also has four municipal water supply wells within 10 miles of the proposed well sites. Sparta wells 2, 4, 8 and 10 are all 8-9 miles to the southwest of the Installation's proposed well sites. There are several private water supply wells within two miles of the proposed wells. The nearest wells are approximately 7,700 feet east of the location for proposed Well 27. Based on well construction records, most of these wells are completed in the Mount Simon Sandstone, and a few may be completed in the overlying Eau Claire sandstone and shale.

The proposed well locations are on the southeast end of the North Post installation, near Tarr Creek and unnamed Creek 20-11 which are both are classified as coldwater Class I trout streams. Proposed Well 27 is 1500 feet from Tarr Creek and 450 feet from Creek 20-11. Proposed Well 28 is 1500 feet from Tarr Creek and 1000 feet from Creek 20-11. Proposed Well 29 is approximately 1100 feet from Tarr Creek and 800 feet from Creek 20-11. Proposed Well 30 is approximately 2300 feet from Tarr Creek and 2000 feet from Creek 20-11.

The valley and ridge topography of the Driftless Area influences the groundwater flow system. Regional groundwater flow in the deep aquifers (St. Peter/Prairie du Chien/Jordan and Cambrian sandstone aquifers) is generally to the west, while the upper aquifer (Galena-Platteville) is dominated by local flow systems that closely mirror the surface watersheds. Heterogeneities such as fractures or changes in the permeability of the bedrock, together with the incised topography, produce groundwater discharge in the form of small springs. These springs generally flow at less than 0.25 cubic feet per second (cfs) but together can contribute significant flow to streams. One spring is mapped about two miles northeast of the proposed wells near Tarr Creek and several other small springs are mapped upstream of the proposed wells near several tributaries to Tarr Creek.

Tarr Creek is a 10-mile tributary to the La Crosse River. Nearly the entire length of the stream lies within the Installation. Tarr Creek has a wooded buffer over most of its length. The stream generally has a sandy bed and provides good habitat for aquatic life. Unnamed Creek 20-11 enters Tarr Creek just south of the Installation well field, which augments flow. Tarr Creek is an Exceptional Resource Water and a Class I Trout Stream. Tarr Creek currently supports a naturally reproducing trout population, which includes Brook and Brown Trout. Habitat improvements have increased the healthy fish populations. Fort McCoy staff have obtained annual flow measurements every June from 1997 to 2009 at several reaches along Tarr Creek and Unnamed Creek 20-11. The 12 year average flow in June in Tarr Creek nearest the proposed well locations is 8.99 cubic feet per second (cfs). Similar measurements in Creek 20-11 yielded a 12 year average flow of 0.28cfs. The Wisconsin Streamflow Model calculates baseflow in Tarr Creek to be 4.3cfs and Creek 20-11 to be 0.3cfs, which is relatively consistent with the measured flow values.

Creek 20-11 is mapped as an intermittent, 1.68-mile long tributary to Tarr Creek and is classified as a Class I Trout Stream and an Exceptional Resource Water. According to Fort McCoy fisheries staff, flow is perennial beginning about half a mile upstream from well 12. This was confirmed during a site visit by DNR staff. The stream flows through a steep-sided valley near the eastern boundary of Fort McCoy. Brook trout have been identified in the lower reaches of Creek 20-11, indicating that it is groundwater fed. Mini-piezometers were installed at several locations in Creek 20-11 to evaluate the potential impact of pumping on the creek. Mini-piezometers were installed in stream substrate to a depth of about 18 inches below the stream bed. Most mini-

piezometers had hydraulic head greater than stream stage, indicating groundwater discharge to the stream.

No concentrated springs have been identified in Tarr Creek or Creek 20-11 adjacent to the well field that supplies Fort McCoy, although the streams are fed by groundwater seepage, and areas of diffuse groundwater upwelling were identified using mini-piezometers.

12. Biological Environment

Tarr Creek and Creek 20-11 are classified as Class I Trout Stream, due to naturally-reproducing trout populations. According to Fort McCoy staff, both Brown and Brook Trout have been documented in the streams. The presence of two threatened/endangered species has also been identified through a review of the Natural Heritage Inventory; historical records indicate that the *Glyptmys insculpta* (Wood Turtle) was observed in the area in 2008 and *Schinia Indiana* (Phlox Moth) was observed in 2010. The entire project area occurs within a Karner Blue Federal High Potential Range. There is a mapped 5-acre broad-leafed deciduous forested wetland (T3K) approximately 1150 feet northeast, and a mapped 17-acre forested shrub/scrub wetland (T3/S3K) 1000 feet south of proposed Well 28. Both wetland areas are associated with Creek 20-11 or Tarr Creek, and neither of these wetland types are particularly sensitive or especially groundwater dependent.

13. Cultural Environment

a. Land use

Land use in the vicinity of the proposed wells is dominated by the military base, which includes residential areas, forested areas and training facilities. Outside the base, the broad valley bottoms are generally used for agricultural purposes while the hill slopes are forested. A sand mine owned by the Unimin Corporation is located approximately 3 miles east of the well field. The proposed well sites are located within the approximately 59,000-acre Installation, which is zoned as federal. Zoning outside of the Installation boundaries is largely agricultural and forestry.

b. Social/Economic

The area in the vicinity of the proposed wells is predominantly rural land use, as described above. The City of Tomah is located approximately 7 miles southeast and the City of Sparta is located about 9 miles southwest of the proposed well sites. The population of Monroe County has increased over the last thirty years from 35,610 in 1980 to 44,673 in 2010, a 25% increase over the 30 year period, with an annual growth rate of around 0.85%. The population of Monroe County is 95.4% white and 4.6% other ethnic groups (2010 census). According to the 2008-2012 American Community Survey 5 year estimates, the largest employment sectors in Monroe County were: Education services, and Health and Social Assistance (21.3%), Manufacturing (17.1%), Retail Trade (11.3%), Public Administration (9.3%), and Arts, Entertainment, and Recreation, and Accommodation and Food Services (8.2%).

c. Archaeological/Historical

There are no known features of archaeological or historical significance within the area to be disturbed by well construction.

14. Other Special Resources

None

ENVIRONMENTAL CONSEQUENCES (probable adverse and beneficial impacts including indirect and secondary impacts)

15. Physical (include visual if applicable)

The proposed wells will be constructed near the existing well field and will result in minimal additional disturbance of the physical environment. Construction activities will include installation of two wells and pitless units at the locations of existing Wells 22 and 23, and two new wells. Existing Wells 11 and 12 will be taken offline and properly filled and sealed. If needed to complete the system upgrade, additional wells may be proposed in the future.

Groundwater pumped from the proposed well would otherwise discharge into Tarr Creek, Creek 20-11, or other surface waters. The maximum impact of the proposed high capacity well will occur during maximum occupancy of the Installation, which currently occurs from May to August, but is anticipated to extend from April to September in the future. The maximum requested pumping rate is 400 gallons per minute (gpm) for each of the four new wells. 400gpm is equivalent to about 0.88 cubic foot per

second (cfs). Wells on the base are pumped on a rotational basis. When the system demands water Well 22 is turned on until demand is met and the reservoir is filled. The next time the system demands water Well 23 is turned on until demand is met. This rotation continues until each well has been used in sequence and then the rotation repeats.

Tarr Creek has a median August flow (Q50) of about 3.9 cfs in the reach directly adjacent to the proposed wells (Wisconsin Natural Communities streamflow model). Baseflow increases to around 6.5 cfs near the main barrack area of the Fort, due to the addition of flow from a tributary (Sparta Creek) and groundwater inflow. Creek 20-11 is intermittent within a mile upstream of the study area, and has a modeled baseflow of 0.3cfs. Model predicted stream flows are consistent with flow measurements taken by Fort McCoy staff on the base between 1997 and 2009.

The proposed wells will operate on a year round basis. If groundwater discharge to these two streams were reduced by an amount equivalent to the water pumped from the proposed wells, the effect would be significant. While water demand at the base fluctuates on a seasonal basis, the average withdrawal based on the annual water use is slightly over 340 gpm, or 0.76cfs. This could cause the upper reaches of Creek 20-11 to dry out earlier in the year than would otherwise be the case and could reduce low flow in the upper part of Tarr Creek by up to 9%. A preliminary GFLOW model developed by Jacob Macholl in July 2013 predicted 46.4% flow reduction in Creek 20-11 and 6.4% flow reduction in Tarr Creek based on pumping of the proposed wells at an average rate of 340 gpm. Geologic records indicate the presence of shale interbedded with sandstone from a depth of about 170 feet to about 250 feet. A pump test was conducted on November 7, 2013 and November 12, 2013 to determine the competence of the shale as a confining unit, and test for water quality of the lower formations. The pump test suggested that the shale layer could be an effective aquitard which could protect surface waters from pumping-related impacts. However, the water quality test results of the lower aquifer were deemed unacceptable. Specifically, officials at the base believed that the iron concentrations in the lower aquifer were of particular concern leading them to eliminate the lower confined aquifer as a potential sole source for the proposed wells.

As described in section 11 above, a pump test using mini-piezometers was conducted on December 3-5th 2013. The test was conducted to determine the level of connectivity between the stream and the upper aquifer, and attempt to more accurately quantify the potential decreased groundwater flux to Creek 20-11 resultant from operation of the wells. Installation operators shut down all wells on December 2, 2013 for 24 hours, with Well 25 on standby to meet any demand. On December 3, 2013 staff from the Installation's environmental division monitored stream stage and mini-piezometer water levels to determine base conditions with the pumps turned off. On December 4, 2013 Well 23 was turned on at 8am and pumped at 340gpm until 8pm. Measurements were taken at the mini-piezometers every 30 minutes from 8am until 12pm and every hour from 12pm until 8pm on December 4, 2013. Measurements were collected on December 5, 2013 to record recovery. Results of the upper aquifer pumping test indicated a decreased discharge in Stream 20-11 of 8.27 cubic feet per day or 0.000096 cubic feet per second (cfs) along all measured reaches combined. This represents a decrease of 0.03% of the August median flow of 0.303cfs, which is not considered significant.

The nearest existing private well is slightly more than 6000 feet southeast of the proposed well. The year round nature of the proposed pumping increases its potential for significant impacts to private wells. According to a drawdown estimate that assumes 100% hydraulic connection between the pumping well and the existing wells, 365 days of constant pumping at 340 gpm will not result in a measurable drawdown at the nearest wells. The City of Tomah municipal wells are more than five miles east of the proposed wells and the City of Sparta municipal wells are more than eight miles southwest of the proposed wells. It is unlikely that the municipal wells at either city will be impacted significantly.

16. Biological

Potential impacts of groundwater pumping include adverse impacts to aquatic populations, especially in temperature-sensitive fish species such as trout. Reduced groundwater input to streamflow results in increased stream temperature and decreased dissolved oxygen concentration. Both of these conditions can inhibit trout development. For example, in coldwater streams such as Creek 20-11, Michigan modeling of fish population responses to changes in streamflow predicts that a flow reduction of 14% will result in an observable change in fish population, and a reduction of 20% will result in an "Adverse Resource Impact" (Hamilton and Seelbach, 2011).[2] In cold-transitional (cool) streams such as Tarr Creek a flow reduction of only 4% can result in a significant impact.[3] Cold-transitional streams have a lower threshold for impact from depletion because they have a higher average temperature, and are thus more sensitive to slight temperature changes due to flow reduction, which may raise temperature beyond the suitable range for trout. The preliminary groundwater model indicated flow reduction in Tarr Creek ranges from 6.4%

[2] For coldwater streams, Michigan defines observable impacts as a 1-3% reduction in the density of Thriving Fish Populations. An Adverse Resource Impact is defined as a 3% or more reduction in the density of Thriving Fish Populations.

[3] For cold transitional streams, Michigan defines an Adverse Resource impact as a 5% or more reduction in the density of Thriving Fish Populations.

to 8.9%. Predicted flow reduction in Creek 20-11 were 46% or greater. Because the analytical model results for both streams indicated a potential for significant impact, additional testing (a pump test) was completed to determine actual flow reductions. During the pump test, well 23 was pumped at a constant rate from December 3-5, 2013, and mini-piezometers were used to measure base-flow reduction to the Creek 20-11. Based on results of the pump test, actual flow reductions are expected to be much lower than modeled reductions.

The proposed wells will be located within a Karner Blue federal high potential range area, and a natural heritage index area designated for Phlox Moth.

Because wells 27 and 28 will be installed adjacent to existing pump houses, utilizing existing infrastructure very little vegetation would be disturbed by well construction. Wells 29 and 30 will be constructed in previously developed areas. Therefore, overall disturbance of vegetation will be minimal.

17. Cultural

a. Land Use

The proposed wells will be located within the existing base, utilizing existing infrastructure and will not result in any change in land use.

b. Social/Economic

The proposed wells are part of a planned/required water supply system upgrade for the Installation. They are one component of a plan to improve sanitary conditions, increase hard capacity and augment fire suppression capabilities. The wells will have very little, if any, social or economic impact. Predicted drawdown to the nearest municipal well, Tomah Well 10 is about 2.6 feet, if wells on the base operate at the maximum forecast water use of 180,000,000 gallons annually. Drawdown is five feet at a distance of 6000 feet in this maximum forecast scenario. Five feet of drawdown is typically used as a screening level for potentially significant impact to private wells. There are no private wells within 6000 feet. Thus, no significant adverse impact to municipal wells or private wells is expected.

c. Archaeological/Historical

None

18. Other Special Resources

The La Crosse River State Fishery Area is within 3.5 miles of the Installation well field, however, the proposed activity will have minimal adverse impact to the Fishery Area, given the distance, the magnitude of flow in the La Crosse River, and the fact that there are several tributaries to Tarr Creek downstream of the proposed wells that will not be significantly affected by the Installation's wells. The project will not have any impacts on any other special resources.

19. Summary of Adverse Impacts That Cannot Be Avoided (more fully discussed in 15 through 18)

Groundwater that is pumped from the proposed well will result in a decrease in groundwater inflow to nearby streams, including Tarr Creek and Creek 20-11, both classified as trout streams. There will also be some minor drawdown in the water levels of nearby existing wells. None of the predicted effects are expected to cause a significant environmental impact to waters of the state.

DNR EVALUATION OF PROJECT SIGNIFICANCE (complete each item)

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20. Environmental Effects and Their Significance

a. Discuss which of the primary and secondary environmental effects listed in the environmental consequences section are long-term or short-term.

The environmental effects related to the proposed high capacity well will generally be long-term in nature, but limited in areal extent, and relatively small in magnitude. Pumping from the well field is essentially continuous, although individual wells are operated on a rotational basis. A pumping cycle begins with one well which runs until the reservoir is filled and then it shuts off. When demand increases, the next well begins pumping until demand is met and then shuts off. This rotation continues on an as-needed basis until all wells have been pumped once and then the cycle repeats. Impact to streamflows and water table levels would cease if pumping were permanently terminated, but this is unlikely for a permanent

military installation which is currently planning for projected water needs in 2025. If flow reduction altered stream habitat to the extent that the aquatic population changed, this could have a long-term environmental effect; however, this type of impact is highly unlikely based on results of pump tests.

b. Discuss which of the primary and secondary environmental effects listed in the environmental consequences section are effects on geographically scarce resources (e.g. historic or cultural resources, scenic and recreational resources, prime agricultural lands, threatened or endangered resources or ecologically sensitive areas).

The proposed wells will not have an effect on geographically scarce resources. Flow reduction in the reaches of Tarr Creek and Creek 20-11directly adjacent to the Installation well field could have minor impacts on trout populations and the value of the trout fishery. This effect will be localized, and other segments of the stream will not be significantly affected.

c. Discuss the extent to which the primary and secondary environmental effects listed in the environmental consequences section are reversible.

The impacts associated with the proposed high capacity wells are reversible. Groundwater levels would rebound following the cessation of pumping, and groundwater inputs to streams would go back to pre-pumping conditions. Any changes in the streams' biological community would also be reversible due to the localized nature of the potential impacts.

21. Cumulative Effects

<u>Past, present and reasonably anticipated wells:</u>
On the property:
There are currently six high capacity wells in the well field that serves the north post distribution system at the Installation, and 20 wells that serve other portions of the base – two that serve the south post distribution system and 18 transient non-community systems that serve more isolated training facilities, shooting ranges and the airport. Total capacity of the six water supply wells is 2050gpm. It is important to note, however, that wells that supply the distribution system are rotated (see section 20a above) and generally only one well is pumped at a time. Total capacity of all wells on the base is 3240gpm. There is a reasonable chance that additional isolated wells with individual capacities below 70 gpm will be completed on the base if they redesign or add new training facilities; however the current water supply system upgrade takes into account a population and use increase including fire suppression needs and reliable supply through 2025. This means that additional wells with individual capacity greater than 70gpm are unlikely, and the smaller wells that could possibly be installed are unlikely to have significant impact on waters of the state.

If the entire annual withdrawal of 180,000,000 gallons were all pumped from proposed well 28, the predicted cone of depression from the water supply wells crosses the property boundary by a maximum of about 1000 feet. This represents a worse-case scenario since Well 28 is the closest well to any private wells. The predicted five-foot drawdown using the annual average of 340gpm over 365 days has a radius of just over 6000 feet. If this radius is measured from the center of the well field, which is more reasonable since the pumping schedule rotates between wells, it does not cross the property boundary. The nearest private wells are about 6500 feet from Well 28. Therefore, the worst case scenario would not result in significant impact to private wells.

Based on the results of the December 2013 mini-piezometer pumping test, the cumulative withdrawals from the water distribution system (i.e. the six high capacity wells nearest to Creek 20-11) will not have a significant impact on the stream. As detailed in section 15 (above), the decreased flux to Creek 20-11 was 0.000096 cfs after 12 hours of pumping well 23 at 340gpm, the annual average pumping rate for the 2025 projected water use. This decreased flux to Creek 20-11 is equivalent to 0.03% of the August median flow. This is not a significant impact by any measure.

Nearby properties:
Cumulative impact analyses were restricted to the 126 square mile Upper LaCrosse River watershed.[4]
Fifty seven percent of the watershed area is contained within the Fort McCoy Military Reservation. Conversely, 72 square miles of the total 93 square miles of base area are within the Upper LaCrosse River Watershed. All water resources of concern are contained within the watershed, and effects beyond the watershed other than slight migration of groundwater divide boundaries are unlikely. In addition to the twenty six wells on the base, there are five high capacity properties and three municipal wells within the Upper LaCrosse River watershed. Three of the properties are cranberry operations, one is a sand mining operation (Unimin), and one is the Sparta campus of Western Wisconsin Technical College. These five properties include a total of twenty wells, ten of which have individual capacities less than 70gpm. Of the ten high capacity wells with individual capacities greater than 70gpm, three are City of Sparta municipal wells, two are Western Wisconsin Technical College wells, one is on the Unimin sand mine and the remaining four are cranberry irrigation wells. Unimin also has four wells (Hi cap #72112, 72113, 72141 &

[4] http://dnr.wi.gov/water/watershedDetail.aspx?code=BL06&Name=Upper La Crosse River

72143) outside of the watershed with a combined capacity of 1850gpm

Four of the ten high capacity wells in the LaCrosse River watershed have been constructed since 2000, three were constructed between 1990 and 2000, and three were constructed prior to 1990.

There are currently no other high capacity wells in the Tarr Creek subwatershed, but there is one proposed high capacity irrigation well that will be located, if approved, about 7300 feet southeast of the Installation's north post distribution system well field, and approximately 1300 feet south of Tarr Creek. There could potentially be additional irrigation wells in the area since there are roughly 890 acres of agricultural land in the Tarr Creek subwatershed, although only about half the land is suitable for irrigation due to steep topography of the marginal farmed areas. About 56% of the length of Tarr Creek falls within the Installation, and all of Creek 20-11 is within the base.

If additional high capacity wells were placed in the Tarr Creek subwatershed, the cumulative impact of groundwater pumping could cause significant environmental impacts to the stream. However, as discussed above, it is unlikely that additional high capacity wells would be necessary to supply the Installation distribution system. Many of the high capacity wells in the LaCrosse River watershed were constructed within the last 20 years. Since most of the watershed area is within the confines of the base and there are topographic and geographic limitations, it is unlikely that enough wells would be installed to result in significant cumulative adverse impact.

22. Significance of Risk

a. Explain the significance of any unknowns that create substantial uncertainty in predicting effects on the quality of the environment. What additional studies or analysis would eliminate or reduce these unknowns?

Groundwater flow conditions in the vicinity of the proposed wells are inferred from information gathered in well construction reports, research in similar areas, and general geologic reports. This information, as well as the degree of connection of the surface water resources in the area was refined and developed further with the pump test using mini-piezometers. Impacts to the surface waters are expected to be minimal based on the results of that pump test. The review of physical impacts in section 15 considers a worst-case scenario in which all water pumped from the wells is removed from the affected streams; this review did identify a potential for significant impacts. However, collection of additional site-specific field data, particularly coupled stream flow and groundwater data and completion of an aquifer pumping test have demonstrated that significant impact to Tarr creek and Creek 20-11 are unlikely. Further work, including development of a three-dimensional model using software such as MODFLOW, could reduce some of the uncertainty of the evaluation, but is considered unnecessary at this time since estimated stream flow depletion is two orders of magnitude less than what is considered to be significant.

b. Explain the environmental significance of reasonably anticipated operating problems such as malfunctions, spills, fires or other hazards (particularly those relating to health or safety). Consider reasonable detection and emergency response, and discuss the potential for these hazards.

The operation of the proposed wells as proposed is unlikely to result in the type of problems listed above. The wells are part of a large scale system upgrade that includes replacing older wells that don't meet current construction code, as well as maintaining a fully pressurized delivery line. Overall, this project will decrease susceptibility to groundwater contamination via spill or backflow. The wells will have electric line power, so no diesel or other fuel is associated with typical well operation. The Installation does have portable diesel generators capable of operating the wells if electrical power is lost. Generators are not stored at the well sites, so risk of diesel fuel spill contamination is minimal.

23. Significance of Precedent

Would a decision on this proposal influence future decisions or foreclose options that may additionally affect the quality of the environment? Describe any conflicts the proposal has with plans or policy of local, state or federal agencies. Explain the significance of each.

Approval of this high capacity well application will not establish any policy or permitting precedent.

24. Significance of Controversy Over Environmental Effects

Discuss the effects on the quality of the environment, including socio-economic effects, that are (or are likely to be) highly controversial, and summarize the controversy.

Any proposed high capacity well has the potential to generate significant public interest and controversy, especially in the vicinity of high-quality surface water features such as trout streams. However, because the requested increase in pumping capacity associated with this application is relatively small, off-site impacts are unlikely, and consequently, the likelihood of

significant controversy is minimized. Since a thorough aquifer characterization, including a stream flow monitored pump test, was conducted any controversy should be further reduced.

ALTERNATIVES

25. Briefly describe the impacts of no action and of alternatives that would decrease or eliminate adverse environmental effects. (Refer to any appropriate alternatives from the applicant or anyone else.)

Applicant Alternatives

- No build option. Without the installation of additional high-capacity wells at the Installation, the water supply system may not be able to meet the needs of the base as the full capacity season is expanded. The base would also not meet the consent order issued by the WDNR.
- Other water sources. It would not be economically viable to obtain water from off-site sources such as the City of Tomah. Construction of additional high-capacity wells is the only available way to obtain the necessary water volumes from both an economic and logistical standpoint.
- Alternate well locations. Ideally, the proposed wells would be located outside of the Groundwater Protection Areas (GPAs) associated with Tarr Creek and Creek 20-11. However, a number of factors limit the viability of locating the wells outside of these areas. Water quality in the area of the proposed wells is a concern, especially iron concentrations. There are geographic constraints as viable options are restricted to the stream valleys, and nearby areas to the north become topographically steep. There are also wellhead protection concerns because some areas of the base are used as shooting ranges that could contaminate nearby water supply wells. Additionally, there are economic concerns as the existing well field and associated infrastructure is located within the GPA, so moving the wells is not an economically viable option.

DNR Alternatives

The Department's alternatives for review of high capacity well application are:

- Deny the application for high capacity well based on probable significant adverse environmental impacts to waters of the state that cannot be avoided by placing conditions on the construction or use of the well.
- Approve the application for high capacity well without conditions.
- Approve the application for high capacity well with conditions designed to prevent significant adverse environmental impacts to waters of the state.

The Department's selected alternative is to approve the high capacity well application with conditions to prevent significant adverse environmental impacts. The Department conducted its review based on the applicant's expected annual water use of 180,000,000 gallons and will limit annual pumping to that amount.

SUMMARY OF ISSUE IDENTIFICATION ACTIVITIES

26. List agencies, citizen groups and individuals contacted regarding the project (include DNR personnel and title) and summarize public contacts, completed or proposed).

Date	Contact	Comment Summary
6/25/13 7/9/13	Randy Sanford (PE, Principal, SEH Inc.)	Project details, water system history (email & voicemail)
7/9/13 7/10/13	John Noble (Fort Mccoy Fisheries Biologist)	Trout stream concerns and flow measurement results
7/11/13	Randy Sanford (PE, Principal, SEH Inc.), Josh Bohnert (Hydrologic Modeler, SEH Inc.)	Conference call – groundwater model and potential additional pumping test

7/23/13	Randy Sanford (PE, Principal, SEH Inc.), Alan Balliet, John Noble, Troy Gamble, Eric Sautbine, Mike Miller (Fort McCoy staff)	Project summary and clarification of DNR requirements
7/26/13	Randy Sanford (PE, Principal, SEH Inc.)	Groundwater modeling methods and results
8/13/13	Michael Miller (Fort McCoy)	Geothermal Well #5 Hydrogeologic Report
8/14/13	Randy Sanford (PE, Principal, SEH Inc.), Troy Gamble, Eric Sautbine (Anderson Engineering), Alan Balliet, John Noble, Mike Miller (Fort McCoy staff)	Environmental Analysis requirements, project timeline, alternative well location viability
8/14/13	Roger Peters (WGNHS)	Geologic logs for existing wells
8/14/13	Dave Hart (WGNHS)	Geothermal well #5 water analyses
9/4/13	Alan Balliet (Chief, Environmental Division Directorate of Public Works)	Scope of Work, Project modification

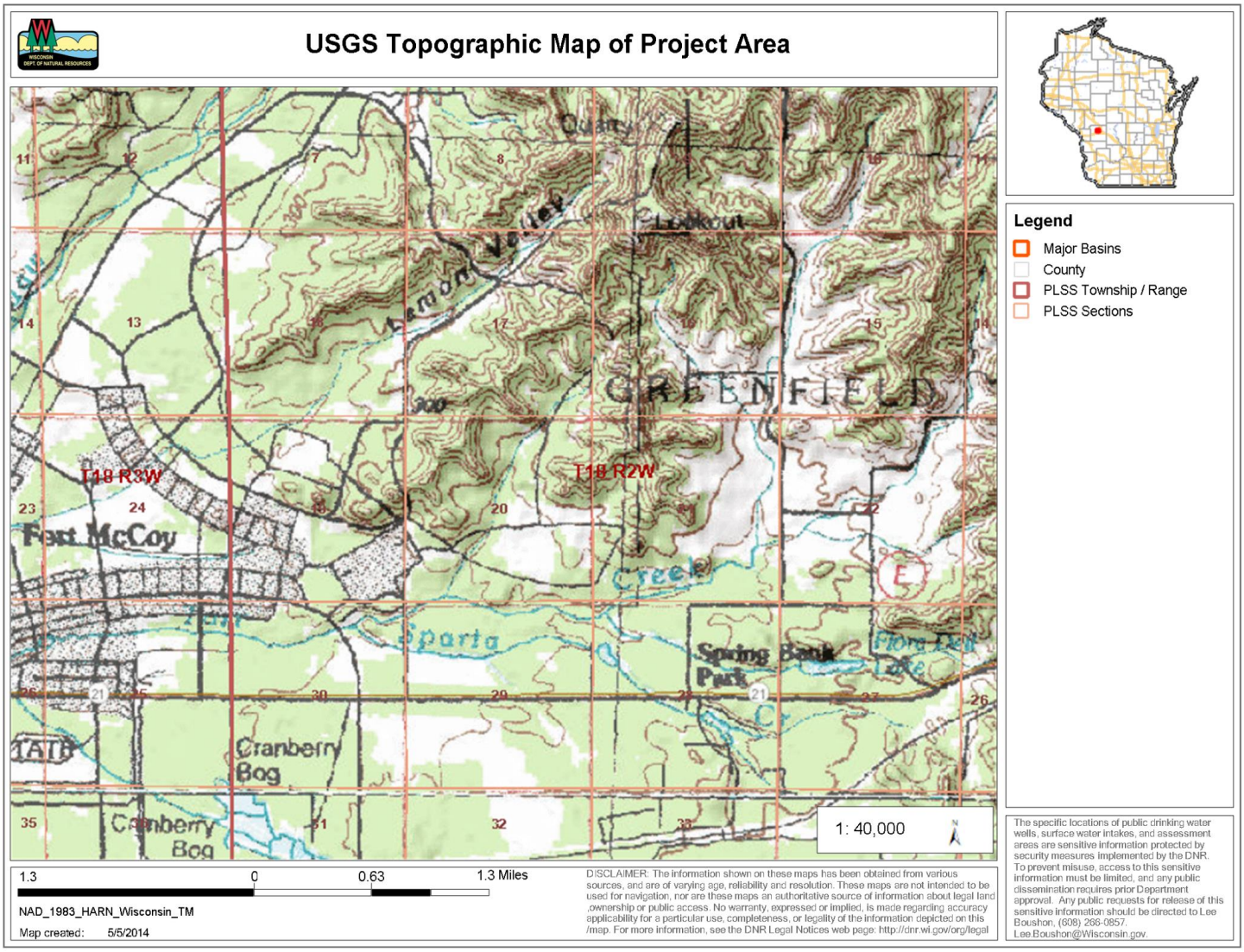


Figure 1. USGS Topographic Map of Project area

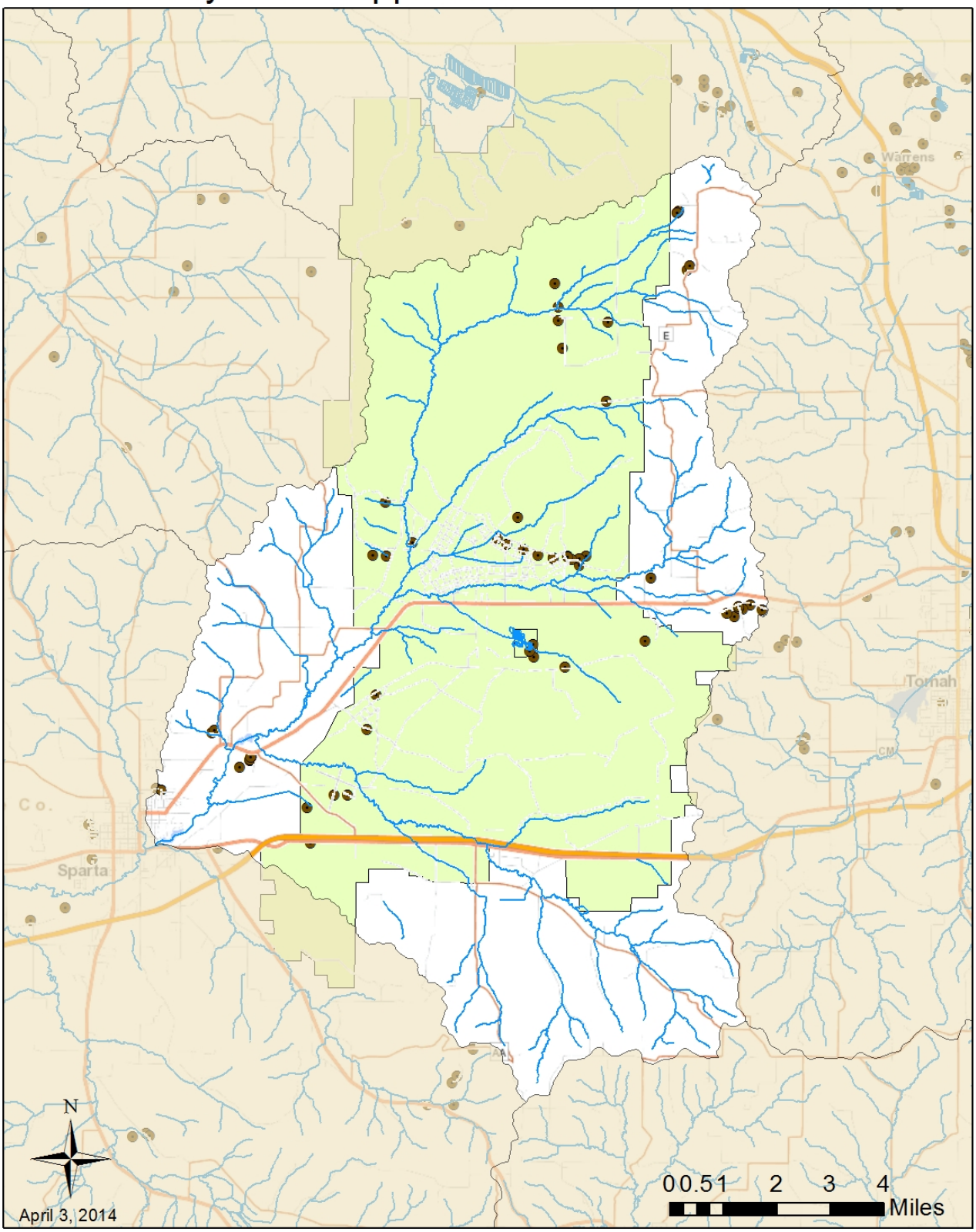


Figure 2. Fort McCoy Military reservation (green shading) and Upper Lacrosse River watershed.

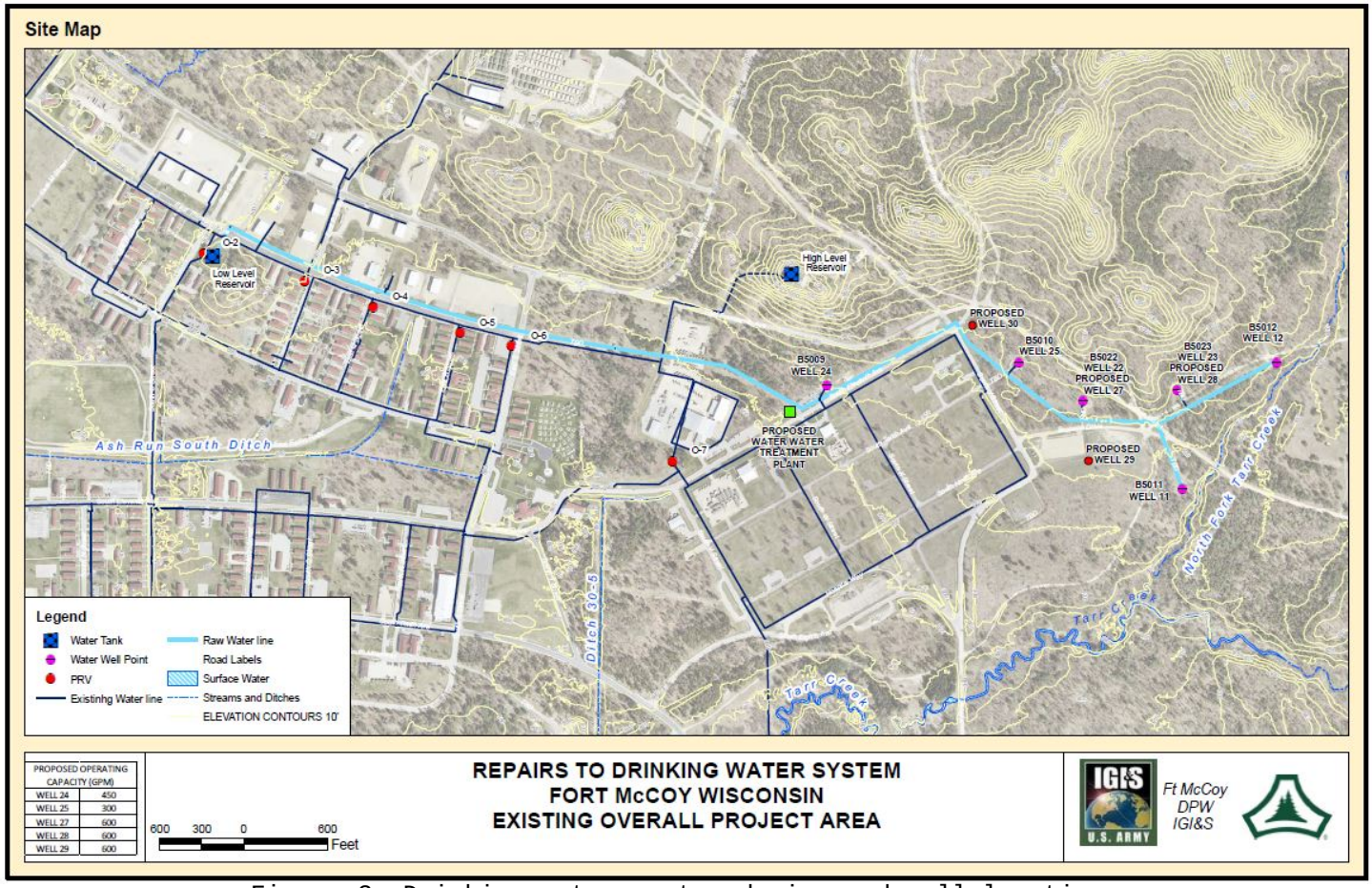


Figure 3. Drinking water system design and well locations

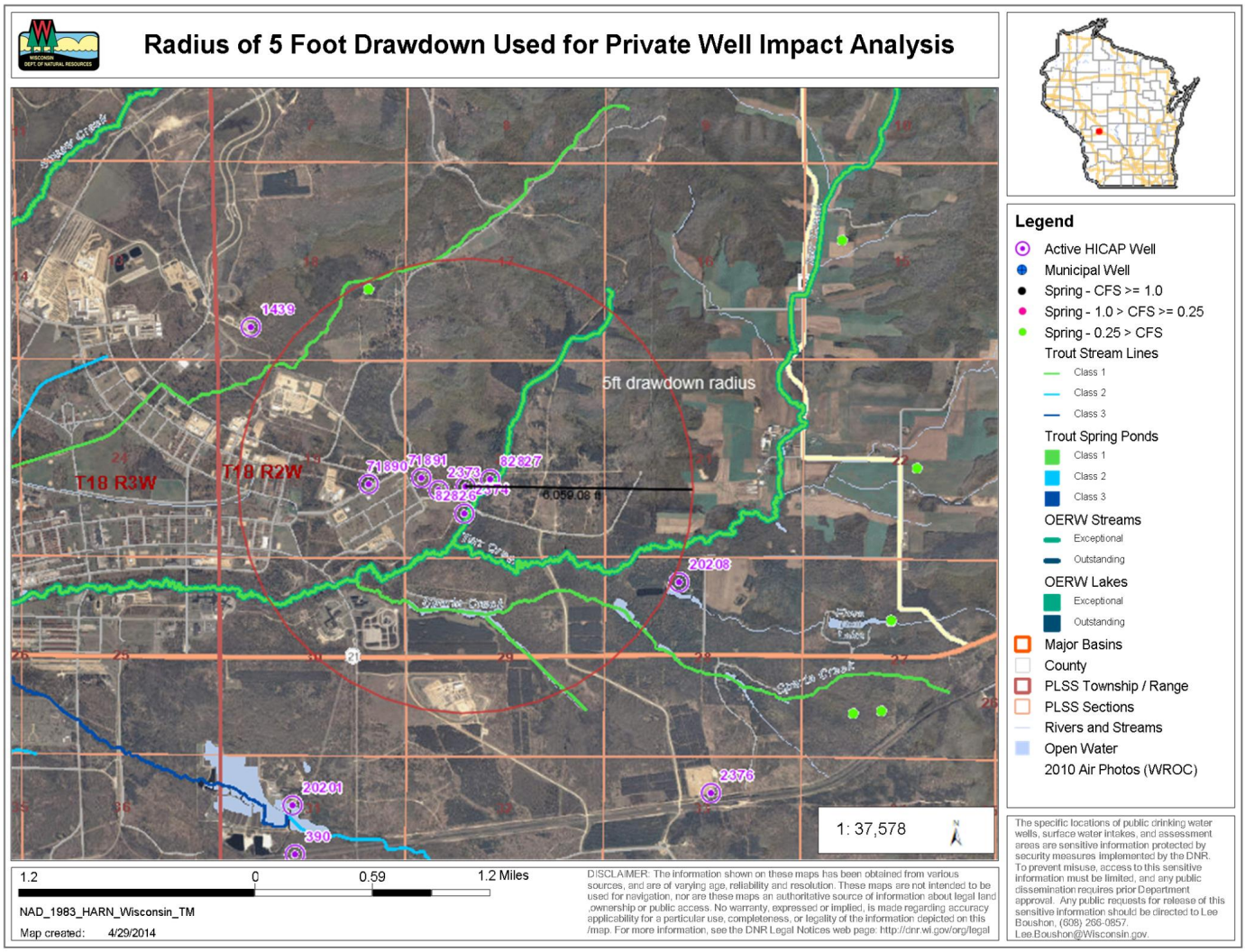


Figure 4. Map depicting area of five foot drawdown centered on Well #28 and based on annual average pumping rate

Fort McCoy EIS Response to Comments

July 24, 2014

Comment 1: *As a representative of the Town of Greenfield Board, I am sending a formal comment concerning construction of the two new high capacity wells at Fort McCoy. The Town of Greenfield Board is concerned as to the impact these wells may have on ponds and private wells located within a few miles of the construction area. These ponds/wells include those located at Flora Dell and Spring Bank Resorts.*

Response: The analysis contained in the draft environmental impact statement (dEIS) focused on potential impact to Tarr Creek and Unnamed Creek 20-11, since they are the nearest water resources to the proposed wells. Given that the Spring Bank and Flora Dell impoundments are 1.6 and 2.0 miles, respectively, from proposed well 28, and both impoundments are upstream, across a shallow groundwater divide and in a different sub-watershed (Sparta Creek), there is very low probability that the Fort McCoy wells would significantly impact the ponds or private wells identified above.

Comment 2: *I am a landowner with an impoundment on Sparta Creek in the NW quarter of Section 28 of Greenfield Township. I am really disturbed that once again more high capacity wells are going in near me with no notification to the actual landowners. One thing that is very much missing from the analysis is that another BRAND NEW high capacity well just went in in the northeast quarter of section 28 of Greenfield township. Undoubtedly the 5 ft drawndown radius of the two well developments overlap. This particular area, including my pond, are Class 1 trout fisheries. The draft environmental impact statement is incomplete until the study looks at the influence of the new well in section 28, as well as the influence of wells on the UNIMIN property in (approximately) Sections 26 and 27.*

Response: There is no statutory provision for notification of nearby landowners prior to construction of a high capacity well. The department currently posts pending applications on our website at http://dnr.wi.gov/topic/wells/highCapWellAppsRecent.html.

The dEIS addressed cumulative effects from past, present and reasonable anticipated wells in the area in section 21 of the document. The irrigation well in Section 28 (High Capacity well #73689) and the Unimin wells, both inside and outside of the Upper LaCrosse River watershed, are specifically mentioned in the document, although at the time the dEIS was written HiCap#73689 was a proposed well.

As for the overlapping of drawdown, or cone of depression, it should be noted that the radius for the Fort McCoy wells was calculated using extremely conservative assumptions in order to rule out the possibility of potential impact. The actual drawdown will be much smaller, based on site-specific study. For instance the mini-piezometer pump test showed that the initial calculation greatly over-estimated impacts.

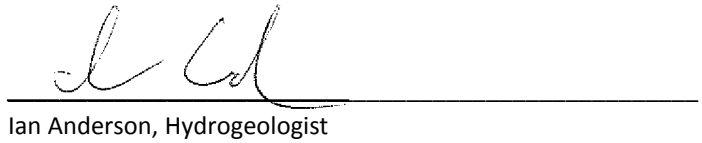
FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DETERMINATION OF WEPA COMPLIANCE FOR FORT MCCOY HIGH CAPACITY WELLS, MONROE COUNTY

FINDINGS OF FACT

1. On May 19, 2014, the Department received the Plans and Specifications for four proposed high capacity water supply wells in the Township of Greenfield, Monroe County from Fort McCoy, 2171 S. 8th Avenue, Fort McCoy WI 54656-5136.
2. The proposed wells required preparation of an environmental analysis under s. 281.34 (4), Stats.
3. Under NR 150.20 (4) (a), Wis. Adm. Code, approval of these wells required the environmental impact statement (EIS) process under NR 150.30.
4. The Department prepared a draft EIS in compliance with NR 150.30 (2).
5. The Department announced the availability of the draft EIS for public review on June 11, 2014, and made the draft EIS available on the Department's web site at the following address: http://dnr.wi.gov/topic/EIA/Current.html.
6. The public comment period closed on July 14, 2014.
7. On July 14, 2014, a reasonable request to extend the public comment period on the dEIS was received from Ms. Susie Zillmer – Clerk of the Town of Greenfield in Monroe County, Wisconsin.
8. On July 15, 2014 the Department granted an extension of the public review period on the dEIS until July 21, 2014. The Department issued a news release announcing the extension and made the news release available on the Department's web site.
9. Public comments were received on the Department's draft EIS from two individuals.
10. The Department prepared a response to comments document to address the public comments received.
11. In compliance with NR 150.35, and 150.50, the Department prepared and published a final EIS on the Department's web page on July 28, 2014 at the following address: http://dnr.wi.gov/topic/EIA/ArchiveTitle.html.

CONCLUSIONS OF LAW AND DETERMINATION

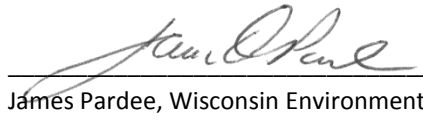
12. The Department has complied with ch. NR 150, Wis. Adm. Code, and with s. 1.11, Stats., for the Fort McCoy High Capacity Wells project.



7-28-14

Ian Anderson, Hydrogeologist
Bureau of Drinking Water and Groundwater

Date



7-28-2014

James Pardee, Wisconsin Environmental Policy Act Coordinator
Bureau of Energy, Transportation and Environmental Analysis

Date