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DRAFT - Technical Memorandum #2
Route Alternative Update

To: David Pergrin, Harford County Division of Water & Sewer Chris Skaggs, Northeast Maryland Waste Disposal Authority	
From: Scott Davis / Bill Lai, HDR	Project: Pumping of Reclaimed Water from Joppatowne WWTP to the NMWDA Waste to Energy Facility
CC:	
Date: October 5, 2007	Job No: 147-67242

RE: INITIAL FORCE MAIN ROUTE ALTERNATIVE REVIEW

1. Objective

As part of the feasibility study to evaluate re-using effluent from the Joppatowne wastewater treatment plant (WWTP) as cooling water make up for the proposed WTE, force main routes must be evaluated to determine the best conceptual route.

This technical memo presents HDR's initial findings from a site visit performed on October 25 and 26, 2007 and from a preliminary review of property owner data. Remaining items required to complete the route alternatives analysis are presented. During the site visit, HDR personnel met with David Pergrin of the Harford County Division of Water & Sewer and reviewed the possible route alignments.

As noted in Tech Memo No. 1, the approximately 3.5 force main will be designed as a High Density Polyethylene (HDPE) line, 10-inch diameter SDR. HDPE typically arrives at the site in spools or 20-foot lengths, and has to be fused together as the pipe is laid. Since this is a force main, we recommend 4-feet of coverage, with air release and flushing hydrants along the route, with occasional inspection manholes for monitoring the condition of the force main. The final route analysis will be completed within the next few weeks.

2. Route Alternatives

To simplify route selection, HDR created four regions, each of which contains two or three different route alternatives. The regions are shown in Figure 1. Descriptions of each region are as follows.

Figure 1: Route Alternative Map

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1. Region 1 includes routes from the WWTP to the Foster Branch stream crossing. Due to the size of Region 1 and range of alternatives, it was spilt into two sub-regions.
    a. Region 1A is for routes north of Joppa Farm Road; and
    b. Region 1B is for routes on Joppa Farm Road and areas to the south.
2. Region 2 consists solely of the Foster Branch stream crossing in Robert Copenhaver Park.
3. Region 3 includes the routes from Foster Branch to Fort Hoyle Road.
4. Region 4 includes routes from Fort Hoyle Road to the WTE facility off of Magnolia Road.

Each of the routes will be screened and evaluated based on project planning issues, listed as follows: constructability, land acquisition, community impact, environmental and operations. As we present some of our findings from our field investigation, we will mention positive and negative impacts that the recommended routes will have relative to the screening criteria.

3. Region 1

The force main leaving the WWTP has two routes to reach the outside of the WWTP property. One route is through the main entrance to Shore Drive. The second option is through the delivery truck access road, on the eastern side of the plant, to Joppa Farm Road. Based on preliminary review of property ownership, the eastern access driveway is County owned property and construction would be within the right-of-way. The driveway is between the post office and Joppatowne Plaza, both of which have entrances off the driveway.

Other issues for leaving the plant include wetlands and buried pipes. The yard piping plan, prepared by Stearns and Wheler and dated March 20, 1997, shows numerous pipes in the open area between the proposed pump station and the eastern driveway which could impact this route. Along the western portion of the site, the County has indicated there may be wetlands outside the fenceline, however there are no buried pipes along the western side of the plant. It appears that the most beneficial route is to exit along the main entrance, which is easier to access from the proposed effluent reuse pump station location.

Region 1 was broken into two sub-regions. The sub-regions are shown in Figure 2 below.

Figure 2: Regions 1A and 1B

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3.1. Region 1A

Region 1A consists of the region north of Joppa Farm Road and extends east to Foster Branch. Three routes have been identified in this region, as described below.

1. Route 1A-1: Travel east on Joppa Farm Road, north on Barksdale Road to Baldwin Drive, east on Baldwin Drive to Jonathan Drive to Falconer Road, north on Falconer Road to end of cul-de-sac, east through the sewer easement to Trimble Road, east on Trimble Road to Garnett Road. The sewer easement between Falconer Road and Trimble Road is located in privately owned open space.

   A possible alternative is to route the force main from Barksdale road through the County-owned water tower property to Winesap Court, then to Falconer Road.

   This route has many changes in direction as it proceeds from the WWTP to Foster Branch. There will be **significant community impact** with this route since the force main will be constructed in a populated residential area with an elementary school on Barksdale Road. The **constructability will be low** for the section on Trimble Road, which is narrow and winding, and in the narrow sewer easement at the end of Falconer Road. Trimble Road is one of the main traffic routes that connect the Rt 40/Rt.7 corridor to the Aberdeen Proving Ground (APG) area, so significant detours and traffic maintenance will be required. The **environmental impact is high** and includes a minor stream crossing on Joppa Farm Road, just west of Barksdale Road. The stream is unnamed and will be referred to as Stream A in this document. The area surrounding Stream A is within the 100-yr flood plain. Additionally, Joppa Farm Road and Barksdale Road, through Averill Road, are within the Chesapeake Bay Critical Area. There will be **no land acquisition** required for this route, but use of existing easements and possible construction outside the right-of-way may be required.

2. Route 1A-2: East on Trimble Road to Garnett Road. This northern most route has **low constructability** due to the width of Trimble Road, and the changes in direction and elevation that would not be conducive for a force main. **Community impact will be lower** as this area is less densely populated; however there is a Fire Station. **Environmental impact is lower** than route 1A-1, with only a minor stream crossing of Stream A on Trimble Road, just west of Averill Road. The stream crossing is just north of the 100-yr flood plain boundary. There will **be no land acquisition** required for this route, but construction could extend beyond the right-of-way.

3. Route 1A-3: East on Joppa Farm Road, North on Barksdale Road, east through the Baltimore Gas and Electric (BG&E) utility easement to Garnett Road. Initial review of property ownership shows the BG&E easement through this area is largely County owned, a portion of which is part of Joppatowne High School. The remaining County-owned section of the easement has a legal note of "US Government Elec T&T". A small portion of the easement, between Breslin Road and Falconer Road, is privately-owned open space. Construction in the easement **may require land acquisition,** negotiation with the electric utility, or modifying the legal terms of the easements.

   This route has **moderate constructability and minimal community impact.** Constructability will be impacted by the utility lines in the easement and any buried utilities. There is **moderate environmental impact** along this route as there is a small stream crossing of Stream A on Joppa Farm Road, just west of Barksdale Road, and a small stream crossing in the utility easement just east of Falconer Road. The stream in the easement is unnamed and will be referred to as Stream B in this document. There are also possible wetlands in the easement in the block between Falconer Road and Hinton Road. Joppa Farm Road and Barksdale Road, through Averill Road, are within the Chesapeake Bay Critical Area.

HDR's initial review is that options 1A-1 and 1A-2 are not ideal alternatives as Trimble Road is a narrow, winding road that will make constructability difficult. Joppa Farm Road has numerous buried utilities, which could require construction outside of the right-of-way. Issues to be resolved include determining access in the BG&E easement, specifically the County owned section with the legal note, and in the narrow sewer easement off of Falconer Road.

3.2. Region 1B

Region 1B consists of the region south of Joppa Farm Road and extends east to Foster Branch. Most of the area is within the Chesapeake Bay Critical Area. Two routes have been identified in this region, as described below.

1. Route 1B-1: East on Joppa Farm Road to Garnett Road. This route has **good constructability** as the road is wide and fairly flat and straight. There will be **significant community impact and more buried utilities** on this route. Joppa Farm Road appears to be the main traffic artery to travel east and west in Joppatowne, so traffic maintenance will be required. **Environmental impact is moderate** and includes a minor stream crossing of Stream A just west of Barksdale Road. The area surrounding the stream is within the 100-yr flood plain.

2. Route 1B-2: East on Joppa Farm Road, south on Shore Drive, east on Town Center Drive, east on Joppa Farm Road to Garnett Road. **Constructability is lower** on this route due to anticipated high groundwater levels near the shore. The **community impact is high**, especially on the eastern portion of Town Center Drive. There is a minor stream crossing of Stream A on Shore Drive. The stream crossing and surrounding area is within the 100-yr flood plain. There is a second stream crossing, Stream B, on the eastern portion of Town Center Drive. This stream flows south from the BG&E easement just east of Falconer Road.

Route 1B-2 has numerous issues, including its closeness to wetlands and park area and the narrowness of Town Center Drive.

3.3. Region 1 Summary

Based on our initial review, it appears that routes 1A-3 and 1B-1 have the most apparent positives in terms of greater constructability and lower environmental and community impact. These alternatives appear to be the optimum routes to reach Foster Branch. All alternatives will be evaluated and ranked using the matrix described above.

The force main will be routed north or south along Garnett Road if the optimum Region 1 route does not align with the optimum Region 2 route. There will be some community impacts and utility crossings associated with construction on Garnett Road.

4. Region 2

Region 2 consists of crossing Foster Branch in Robert Coperhaver Park, as shown in Figure 3. The park land is County owned, so **no land acquisition is required and community impact will be low,** although the construction will affect park usage. There are three possible locations for crossing the stream. All other locations would require going through private property. **Environmental impact will be high** for all options as the entire stream length is within the Chesapeake Bay Critical Area and the 100-yr flood plain. The three locations are:

1. Route 2-1: Crossing on Trimble Road under two branches of Foster Branch. This is the northern most crossing. Each branch is in a culvert. The force main would have to go under the culverts as there is little cover above the culverts. **Constructability is good** as the DPW recently installed a force main under the culverts using direct buried construction. Trimble Road is narrow at this crossing, which may affect traffic.

2. Route 2-2: Crossing through the park at the utility easement. Foster Branch has combined into one channel at this point. The crossing is in a gully. **Constructability is**

more difficult for this option as a trenchless operation is likely required, plus the overhead and any buried utility lines must be avoided. Ownership of the utility easement in this area is unknown as the property records are labeled "Transline".

Figure 3: Regions 2, 3, and 4

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3. Route 2-3: Crossing on Joppa Farm Road, the southern most crossing. The stream goes through one large structure with two culverts. The top of the culvert may have enough cover to allow the force main to be above the stream. **Constructability is good**, and the road is wide to minimize community impact.

The Trimble Road and Joppa Farm Road options appear easiest for construction. Ownership of the utility easement must be determined prior to route selection.

The force main will be routed north or south on Foster Knoll Road as required to meet the optimum route for Region 3. There will be a stream crossing, referred to in this document as Stream C, on Foster Knoll north of the utility easement. The southern portion of Foster Knoll Road is in the Chesapeake Bay Critical Area. There will be some community impacts and utility crossings associated with construction on Foster Knoll Road

5. Region 3

Region 3 includes routes from the east side of Foster Branch to Fort Hoyle Road. Figure 3 shows the proposed routes. The five proposed routes include routes utilizing the proposed easement through Hackley's Reserve and routes bypassing Hackley's Reserve.

1. Route 3-1: East on Trimble Road to Fort Hoyle Road. There are two sewer lines and a water line along this section of Trimble Road, which **will impact construction** and may require moving out of the ROW. **Community impact will be high** as there are numerous residences on Trimble Road. As noted previously, Trimble Road is one of the main traffic routes connecting the Rt 40 corridor to the APG, so traffic maintenance and detours may be required. **Land acquisition may not be required**, depending on work outside of the ROW. **Environmental impacts will be low**.

2. Route 3-2a: East on Joppa Farm Road to Haverhill Road, then east through the future Hackley's's Reserve subdivision to Fort Hoyle Road. This length of Joppa Farm Road is fairly densely developed, but there is generally an open space buffer between the road and the residences. **Community impacts during construction will be minimal** in Hackley's Reserve, which is currently undeveloped. **Construction will be straightforward** and **environmental impacts will be small**. **No land acquisition is required**, but use of the easement through Hackley's Reserve is required.

3. Route 3-2b: East on Joppa Farm Road, North on Haverhill Road, East on Trimble Road to Fort Hoyle Road. This route has **greater community impact** since construction is along residential roads. In addition, there are numerous utilities on Trimble Road, as

noted above, which **will impact constructability**. **Environmental impact is low**, with only the portion of Joppa Farm Road west of Stillmeadow Drive is in the Chesapeake Bay Critical Area.

4. Route 3-3a: East through the BG&E utility easement, east on Joppa Farm Road to intersection with Haverhill Road, east through the future Hackley's Reserve subdivision to Fort Hoyle Road. **Community impacts would be negligible** since the route is through privately-owned open space and the future Hackley's Reserve. **Constructability is high** since the route largely travels through undeveloped land, and the section in the utility easement is short. There is a drainage swale/stream, referred to as Stream D, running along the south side of the easement that may be impacted, otherwise **environmental impact is low**. **No land acquisition is required**, but use of the easement through Hackley's Reserve is required.

5. Route 3-3b: East through the BG&E utility easement, north on Haverhill Road, east on Trimble Road to Fort Hoyle. As noted above, there will be a **low environmental impact** on Stream D, which could be impacted during construction in the easement. **Constructability is lower** due to the presence of overhead, and possible buried, utilities in the BG&E easement. Also, this section of Trimble Road will require work around numerous buried utility lines. **No land acquisition is required**, but use of the easement and possible legal agreements will be required. **Community impact will be high** due to the residences along Haverhill Road and Trimble Road.

Maps of the proposed easement through Hackley's Reserve sub-division are required to complete the analysis of this section. Routes 3-2a and 3-3a will be investigated in the detailed route analysis and the ranks will be impacted if there is no easement. If there is no easement, routes 3-2b and 3-3b will also be investigated. Other issues to be resolved include determining access to the BG&E easement in the privately owned open space and determining constructability outside of the right-of-way on Trimble Road.

No routes running south on Haverhill Road were investigated as this would require going through the active quarry or would significantly increase route length along the rail line easement to reach the WTE.

6. Region 4

Region 4 includes routes from Fort Hoyle Road to the WTE, located east of Magnolia Road and includes the rail line crossing. These routes are shown in Figure 3 and are described below.

1. Route 4-1: South on Fort Hoyle Road, cross tracks through access gate, east along the utility easement or train track easement. This route has **moderate community impact** as there are few residences along Fort Hoyle Road. Fort Hoyle Road is narrow, which will affect truck traffic to the quarry during construction. **Constructability is moderately difficult**, due to the narrow width of the road. The tracks at this location are level with the road, so no significant elevation change in the force main will be required. A parcel south of the tracks appears to be privately owned, which **will require an easement or property purchase. Environmental impacts are moderate,** due to the possible presence of wetlands south of the train tracks.

2. Route 4-2: East through the south end of the school property, south on Magnolia Road. **Constructability through the school is high** as the property is largely fields. However, Magnolia Road is the entrance to the Harford County WTE, so garbage truck traffic is extremely heavy on this road. This traffic must be maintained during construction, and will add to the construction difficulty in this area. **Community impact is moderate**, due to construction near the school. **Environmental impact is moderate**, as the school property is largely developed. However, there may be a stream crossing at the eastern portion of the school property and the southern portion of Magnolia Road is within the 100-yr flood plain.

3. Route 4-3: East on Trimble Road, south on Magnolia Road. This route has the **greatest community impact** as construction on Trimble Road will affect the Magnolia Elementary School and a greater volume of traffic. **Environmental impact is moderate**, as noted above the southern portion of Magnolia Road is in the 100-yr flood plain. **Constructability is high** as all construction is in large roads, which will allow traffic to pass during construction. **No land acquisition is anticipated.**

The rail crossing for Routes 4-2 and 4-3 will be either hung below the overpass or under the tracks east of Magnolia Road. Unless it is determined that the pipe can be suspended below the overpass, HDR will assume this option is not feasible and the pipe must go under the tracks. If crossing east of Magnolia Road, the preferred route is to follow the new sewer line east, then turn south to cross under the tracks to the WTE. This area east of Magnolia Road and north of the tracks is largely in the 100-yr flood plain. There also may be a minor stream crossing.

Detailed property owner information and easements for the newly installed sewer line are required for the area east of Magnolia Road and north of the train tracks. In addition, ownership and crossing requirements for the tracks must be determined.

7. Route Analysis

Proposed routes will be compared using the criteria in Table 1 below. There are five categories, with potential impact factors identified for each category.

Table 1: Route Alternative Ranking Criteria

Evaluation Factor	Description	Unit of Measure
Operations Impacts		
Maintenance Accessibility	Maximum distance from an access road	Linear Foot
Community/Traffic Impacts		
Local Businesses	The length of an alignment within a commercial/business zone.	Linear Foot
Schools	Distance to the nearest school being affected.	Linear Foot
Residential	Distance within a residential zone	Linear Foot
Intersections Affected	Number of intersections affected.	Each
Truck Routes	Length of existing truck routes in alignment.	Linear Foot
Environmental		
Chesapeake Bay Critical Area	Length of alignment within Chesapeake Bay Critical Area	Linear Foot
Wetlands and Vernal Pools	Length of alignment within Wetlands or Vernal Pools	Linear Foot
Length in 100-yr Flood Plain	Length of alignment in 100-yr Flood Plain	Linear Foot
Minor Stream/Water Crossings	Minor stream/drainage swale crossings. (Not including major water crossing of Foster Branch.)	Linear Foot
Sensitive Species	Number of occurrences of sensitive species within alignment.	Linear Foot
Construction Complexity		
Tree Clearing	Acres of tree clearing necessary for alignment.	Acre
Utility Conflicts	Number of occurrences of alignment impinging on utility or utility buffer zone.	Each
Construction Duration	Estimated time to complete project.	Months
Foster Branch Water Crossing	Distance of water crossing and buffer.	Linear Foot
Railroad Crossings	Distance of railroad and buffer.	Linear Foot
Length on County/Local Roads (Pavement Restoration)	Length of State/County/Local roads encountered during alignment.	Linear Foot
Emergency/Evacuation Routes	Length of existing emergency/evacuation routes.	Linear Foot
Land Availability		
Easement Acquisition	Length of easement to be acquired throughout alignment.	Linear Foot
Cost		
Cost	Includes increased cost for difficulty of rail crossing, installation in roadway with pavement cutting vs trenchless installation where required	$

Parameters with the highest weighting factors include length in the Chesapeake Bay Critical Area, utility conflicts, length of the Foster Branch crossing, and length of the rail line crossing. The utility conflicts include access to the BG&E easement and crossing existing underground utilities.

The ranking of the various potential force main alignments will be achieved by applying a ranking system to the potential impact factors within each of the five evaluation categories. Prior to reviewing the alignment alternatives, each impact factor will be assigned a "weight." This "weight" will represent the level of importance the specific factor is deemed to be with respect to the selection of a force main alignment. Weights will range from 1 to 5, with 5 representing the highest level of importance. The level of importance will be determined through a combination of value engineering and the client's specified preferences. Once a weight has been assigned to each impact factor, the various alignments will be scored from 1 to 10 for each impact factor. Scores will be determined by the unit of measure identified in the table above. After a score is assigned for a particular impact factor, the weight system will be applied to determine the significance of each of the factors used to evaluate the alignments. The most reasonable and feasible force main alignments will then be identified by the "highest ranking".

8. Route Evaluation Plan

HDR has performed a site visit to review environmental and construction issues along the potential routes. Pending review of easement information, HDR will complete the route evaluation. A site visit may be required to determine restrictions in the BG&E easement, which is partially County-owned and partially privately owned. Determining ownership and easement rights is necessary to ensure that routes through the easement are feasible. Records are maintained at the Harford County Court in Bel Air, MD. The route alternative report will be completed within the next few weeks. Based on our initial review of the alternate routes, there appears to be two realistic options for the force main route from the WWTP to the WTE. One route will be based on using public ROWs along Joppa Farm Road and Fort Hoyle Road. The other route is based on using the BG&E easement and the sewer easement through County property to cross the railroad north of Magnolia Road.

LEGEND:

REGION BOUNDARIES

HDR

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JOPPATOWNE WWTP-EF

DATE
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FIGURE
1

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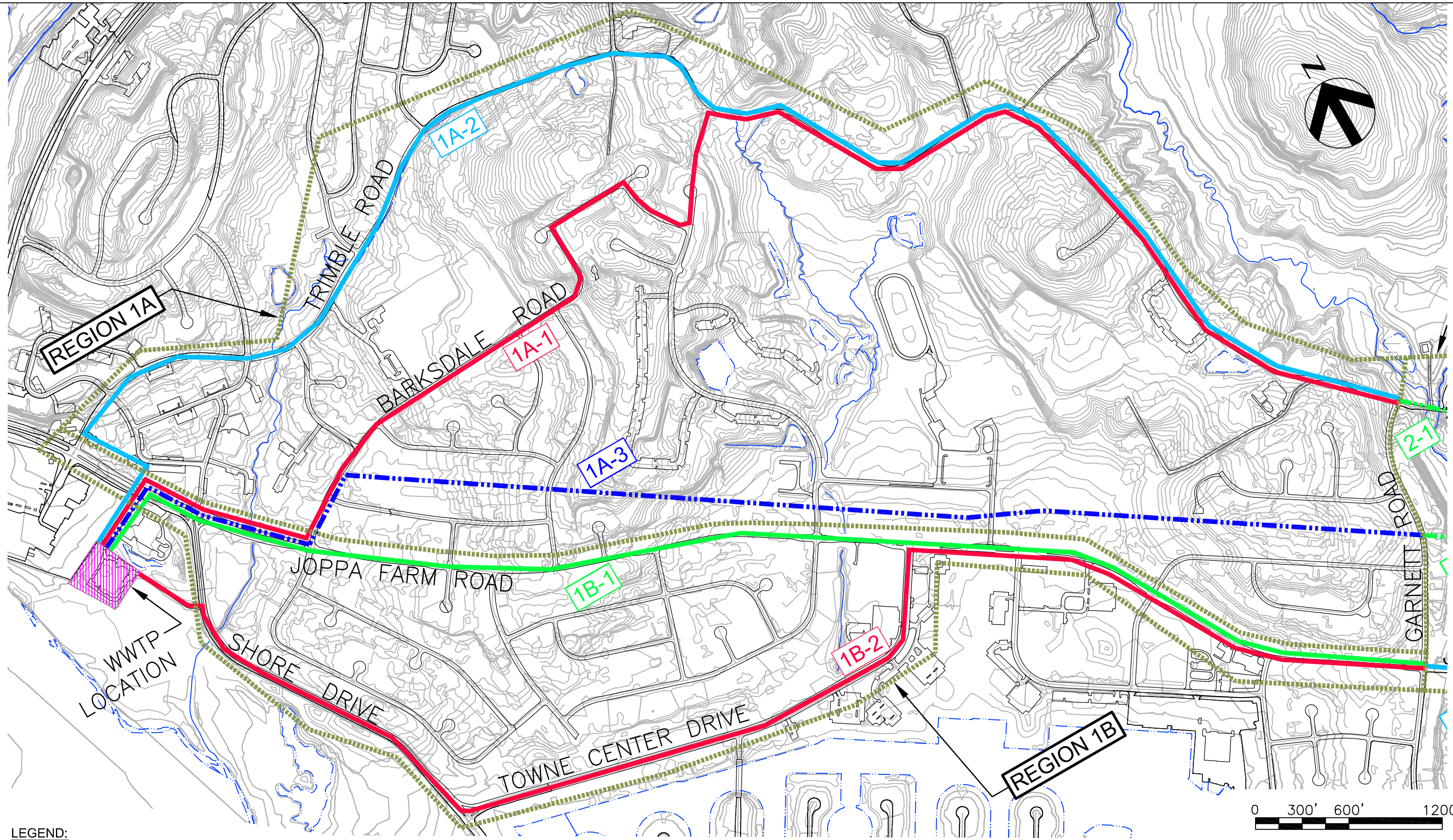

LEGEND:

ROUTES PREDOMINANTLY OFF ROAD

ROUTES PREDOMINANTLY ON ROAD

REGION BOUNDARIES

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DATE 11/2007

FIGURE 2

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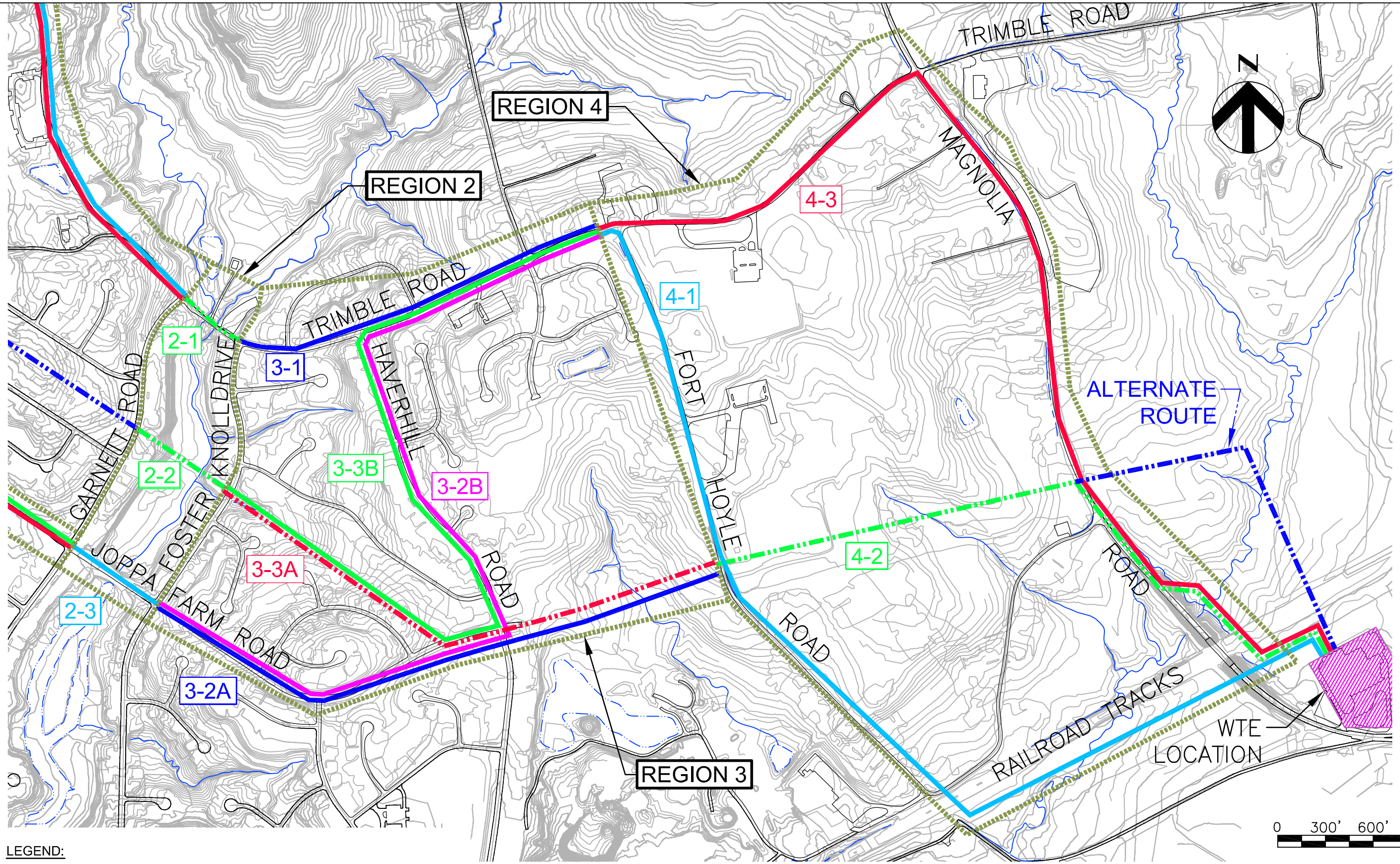

LEGEND:

ROUTES PREDOMINANTLY OFF ROAD

ROUTES PREDOMINANTLY ON ROAD

REGION BOUNDARIES

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FIGURE 3

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