TETRA TECH RIZZO

MEMORANDUM

To: Mr. Nolan Glantz, Chairman, Landlocked Parcel Committee

Fr: Richard D. Alfonso, Director of Land Development Services

Re: **Burlington Landlocked Parcel**

Dt: August 18, 2008

This memorandum addresses issues that have been raised regarding the Burlington Landlocked Parcel. The issues are separated into three basic topics: Natural Resources, Groundwater and Highway Infrastructure. Each of these topics will be presented at the next Landlocked Parcel Committee meeting on August 25th.

NATURAL RESOURCES

The following is a discussion of issues related to natural resources, wildlife, vegetation and water and wetland resources on the site.

Wildlife and Vegetation

Species including deer, turkey, hawks, coyote scat, as well as "interesting vegetation" have reportedly been spotted on the site. None of the observed wildlife species are rare or in decline in Eastern Massachusetts. On the contrary, populations of all these species appear to be growing and all of them can be found widely throughout suburban and urban areas of Eastern Massachusetts. By extension, habitat supporting these species is also not in decline. The Landlocked Parcel property is not mapped as a site of Priority Habitat of Rare Species by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). Appropriate and well-designed development of the site is not expected to adversely impact wildlife populations or available habitat.

References to "interesting vegetation" observed on the site are very subjective because specific vegetative species have not been reported. There have been references to "young trees (perhaps the age of Route 3) with blueberry bush cover" and to "much older trees with more bare ground" on the site. Based upon these observations, the site appears to be undergoing revegetation through natural succession. The young trees with blueberry bush cover (probably lowbush blueberry) suggest that the site is still in early succession from being more open, or that it contains acidic soils which are common in New England. It is feasible that the vegetation observed may be representative of invasive plant species that may have colonized a previously altered site.

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Water and Wetland Resources

Wetland resource boundaries that we observed on the site appear to closely match the GIS wetland data information available from MassGIS. The wetland resource areas on the site will be flagged by a wetland scientist and located in the field by on-the-ground topographic survey prior to the commencement of actual design work. An Abbreviated Notice of Resource Area Delineation (ANRAD) will be prepared and filed with the Burlington Conservation Commission in order to determine the actual jurisdictional boundaries under the Burlington Wetlands Bylaw, Massachusetts Wetlands Protection Act and the Federal Clean Water Act.

Given the size of the parcel (247 acres) and the MassGIS mapped wetland resource areas on the site (approximately 20 acres), the total area encompassed by wetlands is minimal, about 8% of the site.

There are four Certified Vernal Pools located on the site; however there are no areas of Estimated Habitat of Rare Wetlands Wildlife mapped on the site, based upon a check of the most current Natural Heritage Atlas (2006). The Natural Heritage Endangered Species Program certifies vernal pools based on documented presence of one or more groups of species that rely on vernal pools. It is important to note that none of the vernal pools at the Landlocked Parcel were certified due to the presence of rare salamander species (e.g., blue-spotted salamander, marbled salamander) as confirmed by the lack of mapped Estimated Habitat. Instead, these vernal pools may have been certified based on the presence of wood frogs, spotted salamanders, fairy shrimp, or other common indicators (e.g., caddis fly larvae, spring peepers). It is also worth noting that the southernmost vernal pool is located within a highly disturbed utility easement, and may not even serve as a vernal pool habitat anymore.

Current Massachusetts Wetlands Protection Act regulations and DEP Stormwater Management Standards do not prohibit development in the vicinity of Certified Vernal Pools. It is required that such development projects utilize appropriate stormwater treatment technologies (Best Management Practices, or BMPs) for discharges to Outstanding Resource Waters (ORWs), since Certified Vernal Pools are regulated as ORWs under the Massachusetts Surface Water Quality Standards at 314 CMR 4.00.

Under both the state and local wetlands bylaws, the boundary of protected vernal pool habitat ends at the boundary of the wetland resource area. If a development is proposed within the 100-foot upland buffer zone, it is not presumed to alter vernal pool habitat protected under the state and local bylaws, but it may be required to avoid or minimize impacts to upland non-breeding habitat of importance to Vernal Pool amphibians.

Nevertheless, it is not prohibited for any portion of a development to be located within the 100-foot buffer zone to vernal pools.

GROUNDWATER

In reviewing groundwater issues relative to the Landlocked Parcel, three questions arise:

- Does Zone II (Aquifer District) extend into the Landlocked Parcel?
- Does the development plan adversely impact Zone III (Water Resource District) characteristics?
- How do the multiple hazardous waste sites play into this?

The answers to all of these boil down to an understanding of local geology. In general, the Vine Brook Aquifer is part of the Shawsheen River Basin, and consists of a glacial valley filled with stratified sands and gravels at depths of 50 to 100 feet. The valley trends generally northwest-southeast and is bounded to the east and west by crystalline highlands, including the Landlocked Parcel. The Landlocked Parcel itself is saddle shaped, with high spots on the northern and southern ends, and a low in the middle. The Parcel is underlain by two distinct geologic units, which correspond roughly with the two topographic highs. The northern unit is considered part of the Nashoba Zone, and consists of the Andover Granite (a foliated coarse grained muscovite granite with some pegmatite). The southern unit is part of the Milford-Dedham Zone, and consists of a diorite and gabbro complex. The low point of the saddle is coincident with metavolcanics and fractures associated with the Bloody Bluff Fault, running from southwest to northeast.

Zone II (Aquifer District): The aquifer tests contracted by the Town of Burlington in the 1990s were conducted in a manner consistent with both industry practice and regulatory guidelines. The water bearing geologic regimes in play are distinct and have markedly different inherent aquifer attributes. Although the types of bedrock units identified are of moderate hydraulic conductivity, this is a relative term. In general, the hydraulic conductivities of the types of rocks observed is in the range of 10^{-7} cm/s (competent bedrock) to 10^{-3} cm/s (highly weathered upper bedrock), while the sands and gravels are expected to several orders of magnitude higher. Hydraulic conductivities in the flank of the valley have been measured in range of 10^{-4} to 10^{-2} cm/s, while gravel deposits near the center of the valley are expected to be in the range of 10^{-1} to 10 cm/s. Since well yield is proportional to hydraulic conductivity, we can expect the bedrock to provide minimal contribution to the public supply wells. In fact, the median yield of the several dozen bedrock wells in the Shawsheen River Basin is 10 gal/min, while the

unconsolidated aquifers in the Basin sustain yields of several hundred gal/min. The Burlington Town wells pump at 250 to 1,000 gal/min. Because of the large discrepancy between the hydraulic conductivities in the bedrock and in the glacial deposits in the heart of the Vine Brook Aquifer, relative bedrock contribution would be expected to be quite low. The current Zone II delineation was keyed to the limits of glacial deposits; this is entirely consistent with both common geologic practice and regulatory expectation.

Zone III: The Zone III (Water Resource District) delineation applies only to those areas that may at some point contribute to the Zone II. In the case of the Landlocked Parcel, most of the contribution would be expected to be by overland flow from the topographic highs to the midland low near the Bloody Bluff Fault, and then through the wetland and culverts to Vine Brook Aquifer. This central lowland is one of the areas on the Landlocked Parcel that is absolutely not under consideration for development, and its function as a conduit for overland runoff to the Vine Brook Aquifer should continue unchanged. Since storm water management will be designed to mimic existing overland flow, the net effect of the project to the Parcel's role as a Zone III area is expected to be negligible.

Hazardous Waste Sites: In the absence of pumping on the Landlocked Parcel, or changes to its contribution to the Zone II aquifer, there should be negligible impact to management of the Massachusetts Contingency Plan (MCP) sites in the vicinity of the Landlocked Parcel. In general, the MCP Sites are located along a north-south axis located just east of Route 3. They sit upon a shallow shelf of unconsolidated deposits between the Vine Brook Aquifer and Landlocked Parcel crystalline highlands. Many of the releases occurred during a time of less rigorous environmental control on waste disposal. All of these facilities now have access to Town sewer, and the industrial sources for these Oils and Hazardous Materials (OHM) are closely managed. Residual OHM trapped at or near the bedrock-overburden interface at these sites may continue as source material for some time, but in general, active source is being controlled and flow is eastward toward the Vine Brook Aquifer. The Phase II Comprehensive Site Assessments reviewed support the regional site conceptual model with respect to geology and hydrologic characteristics presented here. Flow in these areas is controlled by the actively pumping well-field, and given the divergent hydraulic conductivities between the Landlocked Parcel and the Vine Brook Aquifer, there is very little that could be reasonably done west of Route 3 to adversely impact the general flow characteristics. Management and attenuation of these releases is expected to continue unaffected by any proposed changes in conditions on the Landlocked Parcel.

HIGHWAY INFRASTRUCTURE

This 247 acre Landlocked Parcel has no current legal means of access from Burlington. The site has substantial frontage on the Route 3 limited-access divided highway. The current concept developed by Patriot Partners (see attached aerial view showing approximate northern and southern access locations) considers access to the property and the community accessible open space via a bridge that would span over Route 3 in the northern portion of the site. This would be the initial access point and connect to Middlesex Turnpike. Future access is also being considered in the southern portion of the site opposite Second Avenue. While the configuration of this access is not currently defined, it is assumed that this access point would have connections to Route 3.

Northern Access

The proposed bridge over Route 3 in the northern section of the site will likely be a two span continuous bridge approximately 250 feet in length with a center pier support in the median of Route 3. It would include sidewalks for pedestrians and adequate shoulders for bicycle accommodation (the project proponent will work closely with the Burlington Bicycle Committee and plan for a connection to the Phase 2 bike path). The location and alignment of the crossing will dictate span lengths along with the topography at the crossing. Retaining walls on the roadway approach sections may be needed in order to minimize right-of-way and other environmental impacts. The connecting roadway to Middlesex Turnpike would be approximately 2,000 feet in length and include the sidewalks, lighting, drainage, traffic control, and other necessary elements to provide a safe and appropriate transportation connection.

Based on the information currently available we estimate the order of magnitude construction costs for the northern grade separation to be in the range $10-15 million in current construction dollars. This cost includes the following: complete bridge structure, approximately 2,000 linear feet of new roadway, retaining walls, and consideration for traffic management on Route 3. Bid pricing from recent construction projects, such as Route 128 Add-a-Lane project and our Route 3/Burgin Parkway/Centre Street interchange project, were also used as a check to validate our cost assumptions.

Southern Access

The configuration of the southern access into the site is more complicated then the northern crossing. In this area connecting ramps to Route 3 are being considered along with connectivity from Second Avenue into the proposed development. It will also have a roadway link to the northern portion of the site. The planned improvements will include consideration for Northwest Park and Middlesex Turnpike to access Route 3 via

this new connection. This will help relieve some of the existing traffic congestion on Middlesex Turnpike and adjacent interchanges.

As these improvements are being developed close coordination with the adjacent landowners and the Town of Burlington will be required. Depending on the topography, alignment, and location of the roadway that crosses Route 3, this crossing could be a bridge over Route 3 or a tunnel under Route 3.

The details of this layout will need to be developed in concert with interchange spacing requirements per American Association of State Highway and Transportation Officials (AASHTO) standards. The location may require the need to build collector-distributor roadways that address the traffic demand, weaving, and ramp terminal locations with respect to the existing Route 128/Route 3 interchange. While the specifics of the grade separation and connections to Route 3 still need to be worked out, we estimate the order of magnitude construction costs for the southern grade separation and ramps to be in the range $15- 40 million in current construction dollars.