URS

Memorandum

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Office: Fort Washington

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Subject: Biological Survey
Lake Success Business Park
Bridgeport, CT

This memorandum presents the findings of a biological survey conducted for the 418-acre Lake Success Business Park (Site) in Bridgeport, Connecticut. The scope of the survey was based on the May 22, 2008 proposal to DuPont. In accordance with that proposal, two field surveys were conducted in Spring 2008 by URS ecologists for the purposes of characterizing each covertype (vegetation communities) and the wildlife present at the Site. The specific objectives of the project were the following:

- To generally characterize the covertypes and determine the dominant plant species within each vegetation layer.
- To determine the type and approximate location and extent of covertypes.
- To characterize the wildlife community using the Site.
- To determine the likely presence/absence of threatened/endangered species.

METHODS

Information Review

Prior to the field effort, URS conducted a desktop review of available information to characterize the covertypes on-site and identify potential wildlife use. Included in this review were the "Environmental Report" (DERS 1996), summary of findings for a vernal pool survey (URS 2004), wetland maps, topographic maps and the State of Connecticut's State and Federal Listed Species and Significant Natural Communities map for Bridgeport, Connecticut. Additionally, knowledge of on-site wildlife use was discussed with on-site personnel.

Site Surveys

URS conducted two field surveys at the Site on May 28-30 and June 16-18, 2008. The two surveys were scheduled to correspond with the end of spring migration and early summer to document late migrant and likely summer resident bird species. The surveys were conducted during fair weather to assure the greatest opportunity to observe wildlife, particularly bird, activity. Covertype/vegetation and other wildlife surveys were also conducted during these periods.

During each of the two site visits, two bird surveys were conducted on consecutive days between approximately 5:30 am and 9:00 am for a total of four surveys. Prior to conducting

the first survey, 20 survey locations (Figure 1) were selected primarily along the Site's roadways and located with a global positioning system (GPS) unit. Survey locations were selected in each of the Site's different habitats (e.g., upland forest, open/former industrial, open water, successional, wetland) (Table 1). Five minute surveys were conducted at each location. After an initial 2-minute "settling down" period, all birds observed either by sight (aided by binoculars/spotting scope) or sound within a 100-meter radius from the survey location were documented during the 5-minute period. Weather conditions (including wind, cloud cover and temperature) and covertype were documented for each survey location. All information was documented on standardized data sheets, including other wildlife, besides birds, that was observed. Nighttime surveys were not conducted to document use of the Site by nocturnal species.

Several measures were calculated to express the distribution and abundance of the bird community observed on-site. Distribution is expressed as the percentage of plots a bird species was observed. For example, a 100 percent value indicates that the species was observed at all 20 plots and is, therefore, found throughout the Site in a variety of habitats. A 5 percent value indicates that the species was observed at only one location, which could be an indicator of habitat specificity. Measures of abundance are expressed as the average number of individuals per day and the average number of individuals per survey plot. The average number of individuals per day generally indicates how many individuals of a species were encountered over the course of the survey. The average number of individuals per survey plots indicates the patchiness of a species' distribution. For example, a flock comprised of one duck species could have a low average number of individuals observed per day and a high average number of individuals per plot since they are only found at the Lake.

Subsequent to the bird surveys, information was collected to characterize the Site covertypes. The primary information collected was the dominant species within each vegetation layers, structural complexity of the community, apparent stand health and other general information of note. The approximate boundary of each covertype was sketched on a map for subsequent use in development of a GIS layer. Representative photographs were taken to document conditions within each habitat. Taxa-specific surveys were not conducted; other wildlife were documented either through direct search (e.g., overturning logs or in-stream rocks, etc.) or observing indirect signs of their presence (e.g., nest, scat, etc.).

FINDINGS

Covertypes at Lake Success

The Lake Success Site is a 418-acre property located within a heavily urbanized area of Bridgeport, Connecticut. Surrounding the Site is a densely packed residential area interspersed with commercial and industrial facilities. The fenceline around the Site creates a distinct division between these urbanized land uses and the relatively more naturalized habitats at the Site; there are no contiguous areas of open space in the vicinity of the Site. Topography at the Site is highly variable. The Site supports wetland habitat in low-lying

areas often associated with narrow stream channels that originate off-site, rocky outcroppings, forested uplands, and the 17-acre Success Lake. Given that the Site historically manufactured, tested, and stored munitions (production ceased at the Site in 1989), foundations, concrete pads, laydown yards, excavated areas, and several buildings still in use are connected to each other by an extensive network of roadways.

The Site is primarily forested (deciduous) upland habitat interspersed with other upland (e.g., successional, open/former industrial) and wetland covertypes. An extensive network of paved and dirt roadways traverse the entire Site. Upland areas have been disturbed as part of historical operations or as part of ongoing remedial investigations (i.e., clearing of understory vegetation). Investigations at areas of environmental concern (AECs) include clearing the understory vegetation. Despite the current high level of disturbance within the understory, tree removal has been minimized and the forest canopy left intact.

Vegetation complexity was generally moderate throughout the upland portions of the Site. While the understory was lacking in many areas, additional structural elements improve the capacity of the habitat to provide a variety of niches for wildlife. Standing dead trees and, in a couple of places, wood piles provide a moderate level of structural complexity in areas away from the former industrial portions of the Site where complexity was low. Generally lacking was downed woody debris, snags, and a mid-story due largely to brush clearing activities.

While the Site is largely dominated by an expanse of mature forest, other covertypes including successional, wetlands (e.g., stream channels and open water), and open/former industrial are also present in smaller amounts (Figure 1). Representative acreage of each covertype was calculated based on approximate limits as mapped while on-site and is as follows:

Covertype Acreage	
Forest	277
Open/Former Industrial	55
Successional	15
Wetland	54
Open Water (Success Lake)	17
Total =	418

The following paragraphs briefly describe the primary plant species associated with the covertypes present. The list of vegetation is not comprehensive, instead only the dominant species are indicated. Figure 1 presents a map of the Site with the approximate extent of each covertype. The attached photographic log shows representative photographs of each of the Site's covertypes.

Forest Covertype

The forest covertype is dominated by relatively mature trees ranging between 12 cm diameter at breast height (dbh) to 45 cm dbh with an average tree size of 30 cm dbh. Dominant tree species include gray birch (*Betula populifolia*), black birch (*Betula lenta*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*) and black oak (*Quercus velutina*). The understory is generally open due to vegetation clearing and is largely composed of greenbrier (*Smilax* spp.) and a mix of immature trees of the abovementioned species. Blueberry (*Vaccinium* spp.) was a commonly observed species in the understory. Non-native species such as tree-of-heaven (*Ailanthus altissima*), barberry (*Berberis thunbergii*), oriental bittersweet (*Celastrus orbiculatus*), autumn olive (*Eleagnus umbellata*) and multiflora rose (*Rosa multiflora*) were also commonly observed throughout the Site, particularly associated with the forest edge. Herbaceous cover included grasses, ferns, sedges, and other forbs [e.g., mugwort (*Artemesia vulgaris*), Queen Anne's lace (*Daucus carota*), and goldenrod (*Solidago* spp.)].

Open/Former Industrial Covertype

An open/former industrial covertype consisting of paved and grassy areas, and buildings associated with historic and current site operations, was also present in limited amounts. This covertype was primarily associated with the Site's landfill, buildings, laydown areas, roadways, and several areas under investigation. This covertype is found throughout the Site interspersed with the other covertypes. Vegetation in these areas ranged from absent, maintained grassy areas associated with the landfill, and similar weedy herbaceous, immature tree and shrub species identified for the forest covertype (Figure 1).

Successional Covertype

The successional covertype was present in smaller amounts and was primarily associated with the powerline right-of-ways and other small unmaintained areas that had been largely cleared of vegetation relatively recently. These are found throughout the Site toward the outer edge of the property and serve to create somewhat of a habitat mosaic with the other covertypes. Vegetation in these areas was comprised of weedy herbaceous species and immature trees and shrubs of the species mentioned for the forest covertype (Figure 1).

Wetland Covertypes

Forested, emergent and shrub/scrub wetlands and stream channels comprise the wetland covertype and are found interspersed with the upland covertypes described above (Figure 1 and photographic log). While there are several isolated wetlands located in depressional areas, most of the wetlands are associated with small streams (Roadway Brook, West Branch Roadway Brook, East Branch Roadway Brook, and Tracer Brook) that traverse the Site north to south. According to the Site personnel, the contribution from groundwater in on-site wetlands is greatest from November to May. A majority of the wetlands and stream channels flow through the forested upland such that the forest covertype is contiguous although

species composition shifts to more hydrophytic species located within a relatively narrow band adjacent to these channels. There are also areas of emergent marsh throughout the Site; a good example is the freshwater marsh on the eastern side of the Site associated with Roadway Brook.

The wetlands appear to be relatively undisturbed and are characterized by a stable and healthy vegetation community with a moderate amount of species diversity. The primary tree species found along the emergent wetland boundaries include red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*) and black willow (*Salix nigra*). Alder (*Alnus* sp.), silky dogwood (*Cornus ammomum*), elderberry (*Sambucus* sp.) and blueberry (*Vaccinium corumbosum*) comprise the majority of the shrub layer. Herbaceous vegetation documented included obligate species such as sedges (*Carex crinita*), skunk cabbage (*Symplocarpus foetidus*), cattails (*Typha* spp.) and ferns. Common reed (*Phragmites australis*), a species commonly occurring in disturbed wetlands, was also observed at several wetlands with evidence of recent herbicide treatment used to control extent of this species.

Vegetation complexity was generally moderate throughout the wetland covertypes. A lack of disturbance in the forested wetlands has resulted in vegetative stratification consisting of the canopy of larger mature trees, mid-story of shrubs and immature trees and an understory of herbaceous vegetation. Additionally, the presence of woody debris and snags within some portions of the wetlands enhance structural complexity and may provide habitat for local and migratory wildlife.

Open Water Covertype

Success Lake is present in the west-central portion of the Site. Success Lake is the largest approximately 17 acres) open water body on-site and in part receives its hydrology from stream channels that originate off-site (the contribution of groundwater to the Lake is unknown although groundwater is known to be a seasonal source of hydrology to the on-site wetlands). The Lake supports submerged and emergent aquatic vegetation. Rooted aquatic vegetation, such as spatterdock (*Nuphar lutea*), was noted in Success Lake and associated wetlands immediately to the north of the lake.

Wildlife at Lake Success

The results of the wildlife surveys indicate that the wildlife community at the Site is not unique. The bird community is characterized as a whole below in terms of overall abundance and distribution at the Site rather than by covertype since many of the birds observed can and do occur in multiple covertypes. Habitat specialists (e.g., ducks, great blue heron) that occur in a single covertype are identified as such. Other wildlife are also characterized below on a more site-wide basis. Characterizing not only the bird community but other wildlife as well in this way provides a clear description of how the Site as a whole is used by a variety of wildlife.

Bird Community

Overall, despite historic and current disturbances, the Site supports a diverse bird community comprised of many common species and a few less common species. Many of the common species observed occur throughout the Site's varying covertypes, while other species were associated with a particular habitat type. The timing of the surveys provided an opportunity to observe some late season migratory patterns. For example, Black-and-white Warblers (*Mniotilta varia*) were abundant in the wooded uplands during the late May survey and were nearly absent during the mid-June survey. Given that the Site is in the midst of a highly developed area of coastal Connecticut, the Site provides a relatively large area, albeit not contiguous with similar habitat, for use by local and migratory birds. The former industrial and disturbed landscape, however, does appear to limit the number of species that require large expanses of undisturbed woodland habitat. Nevertheless, the Site does support an abundance of common and a few less common species within a range of habitat types.

Sixty-five species of birds were observed either directly or indirectly during the four surveys (Table 2). An additional four species are either known to occur or were observed outside of the survey period. Eighteen of the 65 species were found in more than half of the survey plots. The five most widely distributed species [American Robin (*Turdus migratorius*), Common Grackle (*Quiscalus quiscula*), Blue Jay (*Cyanocitta cristata*), Red-bellied Woodpecker (*Melanerpes carolinus*) and Gray Catbird (*Dumetella carolinensis*)] are all common species found in a wide range of habitats including open deciduous woodlands, edge habitats and successional areas as found at the Site. The "commonness" of these species concurs with the data and species descriptions from the Atlas of Breeding Birds in Connecticut (Bevier 1994). In addition to the American Robin being the most widespread species at the Site, it was also the third most abundant behind the Common Grackle and the Red-winged Blackbird (*Agelaius phoeniceus*), which were both frequently observed in flocks.

While the top five most commonly observed birds were generally found throughout the Site, there were numerous birds observed that were patchy in their distribution, owing to habitat specificity and/or the tendency to form flocks. For example, Success Lake attracts species dependent upon open water areas for feeding and/or breeding including Mute Swan (*Cygnus olor*), Belted Kingfisher (*Ceryle alcyon*), Northern Rough-Winged Swallow (*Stelgidopteryx serripennis*), and Wood Duck (*Aix sponsa*). While associated with a particular habitat type, the number of species documented using this area indicates that the habitat provides adequate structure and complexity to support a moderately diverse bird community. The bird community found in the upland areas was also diverse with species filling a variety of niches along the landscape continuum including carnivorous hawks in open areas, insectivorous flycatchers in wooded and open areas, insectivorous warblers in the tree canopy, and granivorous house sparrows in the disturbed/industrial portions of the Site.

Other Wildlife

In contrast to the bird community, few other taxa were observed or are known to occur at the Site (Table 2). Lack of contiguous habitat adjacent to the Site and the property fence limit the number and type of other wildlife that can use the Site. Common suburban species including eastern gray squirrel (*Sciurus carolinensis*) and eastern chipmunk (*Tamias striatus*) were frequently observed throughout the upland portions of the Site. The Site also supports a well-studied population of white-tailed deer (*Odocoileus virginianus*), whose population size is monitored and actively managed. There is a general lack of herptile use of the Site although several species of reptiles and amphibians have been documented. Based on several taxa-specific surveys conducted in previous years, the Site is known to support two species of vernal pool amphibian species during the spring. Numerous aquatic and terrestrial insects were also observed and game fish occur in Success Lake.

Threatened and Endangered Species

According to the June 2008 State and Federal Listed Species and Significant Natural Communities map for Bridgeport, Connecticut, there are no threatened or endangered species or communities of concern at the Site. While species-specific surveys were not conducted, no state or federally listed species were observed or are known to occur at the Site. The Brown Thrasher, which was observed in 45 percent of the plots, is identified by the State of Connecticut as a species of special concern. This migratory breeder is commonly associated with brushy woodland edge habitat, which is abundant at the Site.

CONCLUSIONS AND RECOMMENDATIONS

The results of this investigation indicated that the Site supports several upland and wetland covertypes. The upland areas, dominated by mature woodland, are disturbed due to historic Site activities and ongoing vegetation clearing to support current remedial investigations. Wetland habitat is relatively undisturbed and associated with several streams that traverse the Site. The bird community documented using the habitat are diverse and are dominated primarily by common species typically found in a variety of habitats such as suburban woodlands, edges and successional areas. The Site is also used by a few less common bird species. Use by other wildlife is restricted to a few common species primarily as a result of the Site's isolated position in the regional landscape, the lack of contiguous habitat adjacent to the Site and the barriers to migration to or from the Site.

Given the timing of the surveys, it is expected that there are likely migratory bird species that occur at the Site that were not documented. However, it is expected that the range of bird types (e.g., waterfowl, wading birds, songbirds, etc.) that would be most likely to occur at the Site has been documented. Additional surveys, while not planned at this time, would result in adding to the number of species already documented that migrate through or are residents at other times of the year.

References

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