

P-561 Aircraft Prototype Facility, Phase II NAS Patuxent River

STORMWATER MANAGEMENT EXISTING CONDITIONS SURVEY AND ASSESSMENT

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1. INTRODUCTION

1.1 Project Overview

The 25-acre site at the Naval Air Station (NAS) in Patuxent River is the proposed location for a multi-building development consisting of an already constructed aircraft prototype testing facility hangar (Hangar P-558), two additional hangars, and an Engineering Support Center (Building P-227). The site is situated northwest of the intersection between Shaw Road and Switzer Road, in St. Mary's, Maryland. The site is bounded by Taxiway Alpha to the north, Switzer Road to the east, Shaw Road to the south, and an undeveloped area to the west.

The proposed development is divided into three phases. Phase I of the development has already been completed and consists of the 28,641 SF Hangar P-558, an apron, parking lot, access road, associated utilities, and stormwater management facilities. A second hangar, Hangar P-561, will be constructed during Phase II and the third hangar will be included in Phase III. The Engineering Support Center will be constructed at a later time.

Existing ground cover consists of pavement and other impervious surfaces constructed as part of Phase I, forested areas, and grass areas. The site topography is relatively flat, sloping from north to south, with an elevation range between 14 and 33 feet above sea level. Non-tidal, federal "non-jurisdictional" wetlands are present on the site.

1.2 Watershed Information

NAS Patuxent River is located at the mouth of the Patuxent River in the Lower Patuxent River watershed, Maryland 8-digit number 02131101. Portions of the south and east of the base are also part of the Severn watershed, number 02060004. The majority of the project site drains to the existing twin 48" culverts that run underneath Switzer Road and discharge to the stormwater pond located to the northeast of the intersection between Shaw Road and Switzer Road. However, most of the area developed during Phase I discharges to a new 54" RCP culvert that outfalls at the 100-year flood plain limit of Pine Hill Run.

1.3 Phase I Stormwater Management Improvements

The stormwater management techniques utilized in Phase I include Low Impact Development (LID) principles, a water quality open grass channel, a diversion channel, a storm sewer outfall, and two dry swales with stone reservoirs located below underdrain systems. The LID practices utilized include the following:

- Elimination of curb and gutter to avoid concentrated flows from paved surfaces
- Disconnection of roof drains and discharging directly to grass areas
- Grading the site to maximize sheet flow through grass areas and into the grass channels

1.4 Site Soils

The soils on site consist primarily of Othello Silt Loam (Ot), Sassafras Sandy Loam (SaB2), Matapeake Silt Loam (MnA), and Mattapex Silt Loam (MuA). Ot and SaB2 soil types are the predominant soils on the west and south sides of the site, where the open grass channel and grass buffer areas are provided. These soils are classified as well drained and appropriate for infiltration techniques.

2. PHASE I STORMWATER MANAGEMENT ASSESSMENT

2.1 Phase I Stormwater Management Methodology

2.2.1 Water Quality Volume (WQ_v) and Recharge Volume Requirements (Re_v)

As indicated in the Stormwater Management Report prepared by Loiederman Soltesz Associates, Inc., the WQ_v and Re_v for Phase I stormwater management systems were calculated following the *2000 Maryland Stormwater Design Manual*. The correct methodology was used to calculate the volume requirements, however, the calculations only took into account the impervious area added as part of the Phase I construction.

2.2.2 Water Quantity

On account of site constraints and the proximity to an adequate outfall channel, a stormwater management waiver for the stormwater quantity requirements was granted by Maryland Department of the Environment (MDE) for the Phase I construction.

2.2.3 Hydrology

Calculations to determine the curve numbers and times of concentration for the Phase I stormwater management systems followed the TR-55 methodology developed by the USDA. This is an appropriate methodology to determine both of these hydrologic factors.

2.2.4 Site Discharge

TR-55 was utilized to generate the total site discharge for design storm events. This is an appropriate methodology for determining total runoff from a site. In order to adequately size the outfall pipe constructed during Phase I, the hydrographs for design storm events were calculated based on the ultimate development conditions.

2.2 Existing Conditions Survey

On June 2, 2011 Jacobs participated in a site visit of the Phase I Aircraft Prototype Facility in order to assess existing site conditions and to document the build up of sediment at the stormwater outfall at Pine Hill Run. It was noted that sediment present at the outfall was not a result of erosive conditions at the outfall. Rather the sediment present at the outfall is a result of erosive conditions located upstream at the site. During the walk through of the site, it was observed that there is a poor establishment of the permanently stabilized (i.e. grassed) areas. In addition it was noted that there is sediment building up through the grassed swales, specifically at the double culverts crossing beneath the access road to the site.



Photo #1: Buildup of sediment was noted within the grassed lined channels. This photo shows the sediment that has accumulated within the culvert beneath access road to site.



Photo #2: Note the erosion of grass channel embankment at upstream end of culvert.



Photo #3: Concrete flumes into rip-rap lined basin at the southeast corner of the site. Note the poor permanent stabilization of the embankment.



Photo #4: Image of headwall at upstream end of outfall pipe.



Photo #5: Rip-rap lined basin at upstream end of outfall pipe.



Photo #6: Rip-rap lined outlet protection at endwall of outlet pipe. Note the presence of sediment laden water within the rip-rap lining.



Photo #7: Image of endwall at outfall into the 100 Year Floodplain of Pine Hill Run. Note the sediment laden runoff within the storm sewer.

During the development of the Phase II and Phase III Aircraft Prototype Facilities, attention should be made to the establishment of permanent stabilization on the site. Grassed lined swales should also be maintained in accordance with the latest edition of the Maryland Stormwater Design Manual. The use of check dams through any proposed drainage swales will also capture and greatly reduce sediment laden runoff from the site.

2.3 Phase I Stormwater Management Analysis

2.3.1 Water Quality Volume (WQ_v) and Recharge Volume Requirements (Re_v)

An open grass channel and two dry swales are provided in order to meet the water quality requirements. The majority of the water quality volume and recharge volume requirements are met through the use of the grass channel credit, however, the dry swales are provided to meet WQ_v and Re_v requirements for their associated drainage areas. It should be noted that the total site area used to calculate the volume requirements was 16.1 acres (13.0 acres vegetated area plus 3.1 acres impervious area). This calculation only yields the required volumes for the current level of development. The stormwater management approach for water quality volume and recharge volume requirements will need to be revisited during subsequent project phases.

2.3.2 Water Quantity

As mentioned previously, a stormwater management waiver for the stormwater quantity requirements has already been granted by MDE for the Phase I construction. This does not include any future phases of construction and supplemental waivers may be required.

2.4 Conclusion

The water quality and recharge volumes provided as part of the Phase I construction are not adequate for future phases of construction. Additionally, the stormwater management waiver for the stormwater quantity requirements does not cover subsequent construction. Supplemental stormwater management systems and/or waivers will be required in order to sufficiently meet MDE requirements.