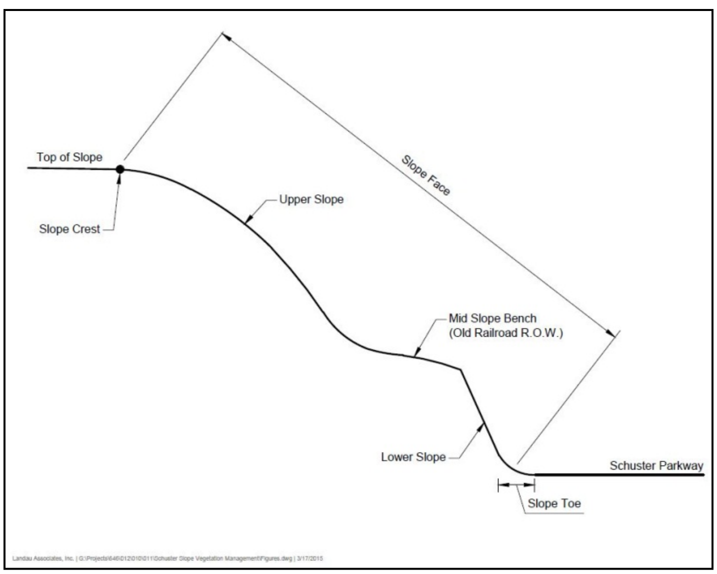
3.0 EXISTING CONDITIONS

3.1 GEOLOGY/SLOPE STABILITY

The geologic setting of the project area consists of glacial and interglacial deposits associated with multiple periods of continental glaciation in the Puget Sound lowlands. The slope geology is mapped as Olympia Beds in the lower portion of the slope. These deposits were laid down by rivers and streams in intervening periods between glaciation. Along the slope crest are glacial till or glacial ice contact deposits. Older glacial deposits are mapped beneath the Olympia Beds in observed areas south of Stadium High School. The entire stratigraphic sequence that makes up the slope has been overridden and compacted by glacial ice and is very dense. It is the soil density that allows the soil to hold a relatively steep vertical face in some areas. The retreat of the glacial ice left behind slopes generally steeper than the soil's natural angle of repose which is approximately 67 percent slope.

The project area consists of a steep, northeast facing slope. Of the 31 acres within the project area, approximately 8.4 acres are slopes less than 40 percent; approximately 8.4 acres are slopes between 40 and 67 percent; and approximately 14.7 acres are slopes greater than 67 percent. Under existing TMC regulations, slopes greater than 40 percent are considered steep slopes and are regulated by the City's Critical Areas Preservation Code. Figures 3A through 3C and 4A through 4C show the slope steepness within the project area. For vegetation management purposes the slope is divided into three parts: 1) the top of slope (area above the slope extending to the point of slope crest), 2) the slope face (sloping portion of a high bank), and 3) the slope toe (point where the base of a slope meets flat ground).



Slope Feature Locations

Along most of the project area, development is up to or near the slope crest consisting of private property, Stadium High School, and Stadium Way. In some areas, the slope crest has been replaced by engineered retaining structures which "fix" the top elevation, or "top of slope". The toe of slope has also been "fixed" by the construction of Schuster Parkway. Regardless of the permanent infrastructure which has fixed the top and toe of the slope, the Shuster Slope will continue to erode in order to reach its stable, natural angle of repose of 67% slope (Landau, 2015).

Slope instability is exacerbated by the slope surface material which is generally comprised of a loose, weak layer of soil referred to as colluvium. Colluvium is formed by the loosening of underlying parent material by rooting plants, burrowing animals and insects, and freeze-thaw conditions. Even if the very dense underlying soil is allowed to achieve its natural angle of repose, the weak colluvium surface layer of the slope is prone to erosion, landslides, and soil creep, especially during periods of intense and/or prolonged precipitation. Butt-bowing of the existing trees is a visible result of these unstable slopes and shifting soils.

3.2 VEGETATION

Forest health is evaluated by considering forest age, structure, composition, function, presence of unusual levels of disease, and resilience to disturbance based on land management objectives (SAF 1998). Although mature native trees are present within the project area, the overall forest health is considered poor in regards to its structure, status, species diversity (both in age and class), and ability to provide stormwater benefit.

The current vegetative condition within the project area consists of a forest dominated by deciduous trees with a sparsely vegetated understory. There are relatively few layers of native understory plants, with very few populations of small trees/large shrubs and limited groundcover. The lack of vegetation layering has left the surface soil under the canopy exposed and susceptible to erosion and intrusion from invasive plant species. Observed vegetative conditions/issues within the project area include: invasive species presence, tree disease, lack of native species diversity, lack of evergreen species, lack of successional progress, and diminished soil binding root mass.

3.2.1 NATIVE SPECIES

The native vegetation on the project site is dominated by a mature canopy of bigleaf maple (*Acer macrophyllum*) and red alder (*Alnus rubra*), with bigleaf maple dominating in monocultural stands over much of the project area. Less dominant native tree species identified include black cottonwood (*Populus balsamerifera ssp. trichocarpa*) and bitter cherry (*Prunus emarginata)*; (Van Pelt et al. 2002).

The typical expected lifespan of a tree will be diminished with the introduction and persistence of cultural stressors, such as limited resources and competition with invasive species. The typical lifespan of bigleaf maple trees is 50 to 200 years (Fryer 2011). Bigleaf maple trees observed within the project area are potentially midway through their lifespan, and many are heavily infested with English ivy. Most of the red alders within the project area are mature and assumed to be nearing their expected life span of 70 years (Menashe 1993). In a typical North Pacific Maritime Mesic-Wet Douglas-fir-Western Hemlock Forest ecosystem (see description Section 4.1), these early successional of “pioneer” species or trees would naturally start to be replaced by longer lived or “climax” coniferous species. There has been little to no observed tree seedlings or saplings of any native species, which indicates that once the mature pioneer trees fail there is a limited potential for the forest to sustain itself.

The native understory is very limited in coverage and is concentrated in small pockets throughout the project site. In these areas, the dominant native understory species is Western swordfern (*Polystichum munitum*), a long-lived, evergreen fern which is indicative of the target ecosystem.

3.2.2 INVASIVE SPECIES

Understory vegetation within the project area is dominated by invasive species, which includes species identified by the Washington State Noxious Weed Control Board (NWCB 2014) as noxious weeds. As defined by the Noxious Weed Control Board, a noxious weed is an invasive plant that when established is highly destructive, competitive, or difficult to control by cultural or chemical practices. Definitions of the class rating system and more specifics on the control methods for invasive weeds present on the site are included in Appendix B.

Within the project area, Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), and old man’s beard (*Clematis vitalba*) have created aggressive monocultures which are actively outcompeting native trees and large shrubs. These monocultures prevent the regeneration potential and compete with desirable vegetation for resources such as sunlight, water, and available nutrients. Additionally, the climbing invasive vines weaken the existing mature trees by adding weight high into their canopies, thus increasing the potential for failure and safety issues.

Invasive species observed within the project area include, but are not limited to:

Class A

- Garlic mustard (*Alliaria petiolata*)
- Shiny geranium (*Geranium lucidum*)

Class B

- Japanese knotweed (*Polygonum cuspidatum*)
- Scotch broom (*Cytisus scoparius*)

- Butterfly bush (*Buddleja davidii*)
- Spurge laurel (*Daphne laureola*)
- Poison hemlock (*Conium maculatum*)
- Tansy ragwort (*Senecio jacobaea*)

Class C and Monitor List as Noted

- English ivy (*Hedera helix*)
- Old man's beard (*Clematis vitalba*)
- Himalayan blackberry (*Rubus armeniacus*)
- Reed canarygrass (*Phalaris arundinacea*)
- English holly (*Ilex aquifolium*) - Monitor list.
- Field bindweed (*Convolvulus arvensis*, a.k.a. morning glory)

3.2.3 TREES

3.2.3.1 Past Management Practices

The project area, in general, has not been formally or routinely maintained for many years due to funding constraints. In addition, historic management practices of the trees within the project site have exacerbated the instability of the Schuster slope, have created pathways for the introduction of disease and decay, and thus have increased hazard potential and decreased overall health. Both permitted and unpermitted cutting and vegetation removal is common along and below the slope crest to create views from private residences. This is observed in bigleaf maple in which repeated coppicing of the tree and subsequent re-sprouting has caused extensive decay in the residual stump and older stems.

3.2.3.2 Hazard Potential

Trees are considered hazardous when all or a significant portion is likely to fail with a high risk of causing injury, damage, or disruption to a target (Smiley et al. 2011). Risk is determined when there is a target within the area which would be impacted if the tree were to fail. Targets specific to the hazard potential include: public roadways, sidewalks, and persons and/or work crews within or adjacent to the project area. Without the presence of a target, a tree failure is not considered a hazard. Damage caused by tree failure is often compounded on steep slopes, as the resulting soil disturbance has the potential to cause further erosion and slope failure.

Tree safety will be increasingly important in the project area as the existing trees reach maturity and the end of their natural lifespan. Tree safety will also be a consideration as public areas are added (i.e. trails). A preliminary hazard tree risk assessment was conducted by ES throughout the project area when the property management responsibilities were transferred, and the most hazardous trees located along Schuster Parkway were removed in early 2014. As part of this plan, it is recommended that hazard tree assessments be conducted annually, and subsequent tree removals be conducted as necessary to mitigate the hazards outlined above. Hazard tree mitigation work should be conducted based on the tree risk assessment recommendations to maintain a low risk potential in public areas and prior to work crews performing any vegetation management activities.

3.2.3.3 Disease

Tree disease presents a concern for slope stability, public safety and forest sustainability. As trees become diseased, both the living and structural portions of the tree can actively decay, resulting in the loss of structural integrity. Damaged trees commonly have decay caused by wood-rotting fungi (Peterson et al. 1999). Improper pruning, such as topping and repeated coppice sprout removal, is a form of repeated injury which creates the opportunity for fungal disease to infect trees. Fungal diseases enter through cut wounds, decays the trunks, and can spread into the rooting system. Due to the historic improper pruning techniques (used principally on bigleaf maple trees adjacent to the slope crest) a number of trees along the slope crest are exhibiting advanced signs of decay which can present a slope stability and safety risk.

3.3 SURFACE WATER

Historically, stormwater from the developed upland areas discharged into unnamed gullies within the project area (GeoEngineers 2000). Currently regulations require stormwater from streets and sidewalks to be captured by a stormwater conveyance system, and no longer are permitted to directly discharge onto the slope. Historical discharges from private properties onto the project area are documented (GeoEngineers 2000).

3.3.1 WETLANDS AND STREAMS

At the time of the original writing of this plan, ES is delineating wetland areas and streams within the project area, and it is anticipated to be completed in 2015. When completed, this information will be added as an appendix to this management plan (Appendix E). It is anticipated that the wetlands within the project area will consist of forested wetlands, the hydrology source primarily from groundwater seeps (GeoEngineers 2014). Wetland plants typical of the target ecosystem include salmonberry (*Rubus spectabilis*), devil's club (*Oplopanax horridus*), red-osier dogwood (*Cornus stolonifera*), Scouler's willow (*Salix scouleriana*), Pacific willow (*S. lucida*), Sitka willow (*S. sitchensis*), Pacific ninebark (*Physocarpus capitatus*) and slough sedge (*Carex obnupta*).

3.3.2 Surface Water Flows

An investigation and inventory of all stormwater conveyance pipes, structures and open flows within the project area should be identified, evaluated, and mapped. Similar to the wetland and streams delineation noted above, ES is conducting this investigation in 2015. A primary goal for this inventory is to locate and identify the nature of any discharge points on the hill slope. This information will allow the City to adequately address modifications to the storm conveyance system which are needed to mitigate for erosion and landslide potential.

3.4 PUBLIC USE

Open space areas have an innate ability to provide public value and function, from recreational opportunities to stormwater benefit.

3.4.1 Trails

This plan focuses primarily on vegetation, but does not prohibit the creation or use of the project area for future recreational uses, including trails. In 1975 the Bayside Trail, a cross-slope connection between Garfield Gulch and downtown Tacoma, was constructed. This trail network was subsequently closed in 2000 after experiencing much vandalism, and high maintenance costs. Existing trails may be used only for access with regard to projects and maintenance, with the intent that after the project has reached a sustainable condition the maintenance access trails will be abandoned. Public outreach conducted in association with the preparation of this plan identified a public desire to have walkable connections between Stadium Way and Schuster Parkway in the southern half of the project area. The City is currently pursuing development of the Schuster Promenade; in concept, a 20 foot wide elevated pedestrian walkway that would parallel Schuster Parkway. This project would effectively serve as a walkable extension to the Ruston Way waterfront and fill a major gap in the City's "Dome to Defiance" vision.

3.4.2 Transient Encampments

Historically, the project area has been frequented by "irregular users." These are users who trespass, import garbage and debris, create hazardous conditions (human feces and hypodermic needles), and/or conduct illegal actions. Deterring irregular users takes a multi-faceted approach of which vegetation management can be one tool. Dense vegetation in public areas provides potential cover for criminal activity, and restricts visibility to create an unsafe environment (UW 2014). Vegetation adjacent to areas which are intended for public use will need to be managed to provide for public safety. Appropriate management actions include allowing sight lines for regular uses (e.g., pedestrians using a sidewalk) and maintaining vegetation to discourage illegal activities. Deterrent vegetation (such as thorny or dense vegetation) may also be used to discourage access into unintended areas.

3.4.3 VIEWS

3.4.3.1 Public Views

The City of Tacoma's Comprehensive Plan recognizes public views as a beneficial amenity of our urban area and geographic location, to be accommodated when feasible with a balanced approach with respect to safety and habitat. During the public outreach process of this management plan, the community stakeholders group encouraged this plan to address view improvement from Stadium Way of Browns Point, Mt. Rainier and Commencement Bay (COT Comprehensive Plan). It is anticipated that public views will be improved as City lead work is completed. The integration of publicly beneficial views into the work plan is further discussed in the Landscape Management Plan Implementation (Section 6.0).

3.4.3.2 Private View Enhancement Requests

The City of Tacoma Municipal Code, Chapter 9.20, currently controls how and when pruning or vegetation removal can occur on public property by, in specific instances, allowing individuals to apply to prune or remove vegetation on public City property. In accordance with this application process, an applicant is required to demonstrate that the proposed vegetation removal will not further degrade the stability of the slope or any regulated critical area per TMC 13.11. This management plan is intended to include processes and vegetation management actions intended for areas below 67% slope which can achieve a private view improvement, as identified in the Landscape Management Plan Implementation (Section 6.0).