infiltration; therefore rainfall occupies the upper layer of the soil profile. Water follows the path of least resistance in the soil which, for these soils, are the spaces between the soil clumps produced by the annual plowing. Although water was present as seepage from the side or bottom of the hole, the soil itself was not saturated. That is, the pores and peds were not saturated because water could not be expressed by hand compression.

The breaks in the soils produced by the plowing are not considered to be peds, which is only applicable to natural breaks in the soil. The 1987 Federal Manual and the 1997 WADOE Manual both reference that when water enters a nonsandy hole at 12", one can assume soils are saturated to the surface. However this assumption does not control over actual physical sampling where the sampling determines that the soils are not, in fact saturated. Neither does the assumption apply to all soils. The observed absence of saturated soils in these samples supports the conclusion that water entering the hole at 12" or higher is not sufficient to saturate soils.

By comparison, samples E14, E16 and E17 experienced rapid infilling of the holes at the May 17th inspection (see Appendix D). In these samples the soils were also saturated throughout, as saturation was observed in the soil or could be pressed out of the soil.

Photographs of select samples are provided in Appendix F.

3.4 Existing Plant Communities & Wetland Areas

3.4.1 General

The National Wetlands Inventory (NWI) indicates that no wetlands are present within the plant site. The NWI map further indicates Sumas Creek as the only wetland feature to be crossed by the utility lines.

3.4.2 Plant Communities

Plant Site & West Mitigation Site

The proposed plant site has been in agricultural use for many years, therefore the vegetative assemblage is determined by the crop that is planted, or the resident grass community, which grows in the fallow year of rotation. Records indicate corn to be the dominant crop since at least 1974, with infrequent cycles of fallow pasture growth or hay. During 1998 the land was fallow and dominated by barnyard grass (*Echinochloa crusgalli*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), broad-leaf plantain (*Plantago major*), timothy (*Phleum pratense*), quackgrass (*Agropyron repens*), and corn stubble. The land was subsequently tilled in October of 1998 for preparation of the following years' planting of corn.

Subsequent inspections this spring (2000) provided the opportunity to observe vegetation prior to plowing of the fields. The vegetation was somewhat sparse and consists of grasses and forbs. Throughout the site is creeping foxtail (*Alopecurus geniculatus*), Western pearlwort (*Sagina occidentalis*), Shepard's-purse (*Capsella bursa-pastoris*), clover; mustard (*Brassica sp.*), American

brooklime (*Veronica Americana*), carrot (*Daucus* sp.), a dandelion like species; buttercup (*Ranunculus* sp.), common plantain (*Plantago major*), and thistle. The vegetative assemblage is not a reliable indicator of wetlands because the annual plowing abnormally distributes seeds and there is no natural or long-term competition. The plants observed in May 2000 established on bare soil without competition from other plants; therefore plants adapted for wetland conditions can also persist in nonwetland areas, particularly during the wet season. Nonwetland plants and wetland plants were found side by side. Based on the 1998 inspection when the field was fallow, it is likely the vegetation present in the spring may not persist throughout the year, or that nonhydrophytic vegetation and invasive species will establish and become dominant as the season progresses.

The farmed pasture wetlands (FWP) and the wetland ditch were both dominated with reed canary grass and interspersed with barnyard-grass during the 1998-growing season, both species which are included in WADOE's list of invasive species.

Part of the west mitigation area that is targeted for wetland creation and enhancement is similarly planted with corn, however, the FWP portion sometimes remains fallow and is then dominated with reed canary grass.

An 8.8 acre, square shaped shrub and tree area is located west of the north part of the plant site. This area has been previously described as a forested wetland, however, it is a palustrine shrub wetland with some forested areas. The owner of the property reported that this wooded area was not cleared and farmed in order to provide a refuge for livestock. 1976 aerial photography indicates only the east ½ to have any significant cover with shrubs or trees, however older and newer photography show higher percent cover suggesting the site has been subject to a series of logging, clearing and subsequent regeneration.

The tree areas possess black cottonwood, paper birch (*Betula papyrfera*), and red alder *(Alnus rubra)*. A few remnant semi-mature red cedars and one Sitka spruce *(Picea sitchensis)* are also present and represent species left from prior logging. Immature red alder and salmonberry *(Rubus spectabilis)* are also prevalent in the tree areas. The surrounding shrub community contains areas of tall shrub and lower shrub stratas. Pacific willow *(Salix lasiandra)*, vine maple *(Acer circinatum)* and red-osier dogwood *(Cornus sericea)*, are typical of the tall shrub area, while low shrub areas consist of salmonberry, Douglas spirea *(Spiraea douglassi)*, sweetbrier *(Rosa eglanteria)* and Himalayan blackberry *(Rubus discolor)*. Noted emergent species were reed canary grass *(Phalaris arundinacea)*, creeping buttercup *(Ranunculus repens)*, stinging nettle (*Urtica dioica*), large-leaved avens *(Geum macrophyllum)* and youth-on-age *(Tolmiea menziesii)*. Himalayan blackberry and reed canary grass are scattered throughout this block and are attributed to past site disturbances by logging and livestock.

3.4.3 Wetland Areas

The NRCS and Corps have confirmed the presence of approximately 4.22 acres of wetlands on the site, not including the wooded area (see Appendix B). The DEA 1995 wetland delineation, which included PC lands that were excluded by the NRCS/Corps, totals approximately 10.42 acres, not including the wooded area (see Appendix A).

Based on the hydrology observed in Spring 2000, Bexar suggests that if the PC designation is disregarded, there are areas that could be added as wetlands, and areas that should be deleted as wetlands from the DEA delineation. A revised wetland map prepared by Bexar, that includes PC lands, contains approximately 12.69 acres of wetlands, not including the wooded area.

The revised mapping relies largely on the samples obtained during the WADOE visits of May 3, 2000, May 17, 2000, and a May 18, 2000 sampling and mapping effort by Bexar. The May 3rd samples were regarded as extreme and not normal due to the above normal rainfall; however it did provide an opportunity to observe drainage patterns, and the opportunity to compare data with other sampling dates. Particular attention was given the results of the May 17th and May 18th samples, as rainfall had receded for a one-week period. During that one-week period, water levels were significantly lower as indicated in the Table in Appendix D.

This accelerated drop in water is attributed to the agricultural manipulations attributed to disking, drain tile and drainage ditches. Wetland hydrology was therefore absent at or near the surface for many of the samples. For these samples, water entering the hole at or above 12-inches was not sufficient to saturate the soils at or near the surface. These areas also coincide with the slightly higher topographic positions on the property. Vegetation was not a useful indicator due to the agricultural nature of the land. The plowing, planting and harvesting has abnormally distributed seeds, and the plants that are present in a pioneer or first successional stage without significant competition. These plants would likely be replaced with a different plant assemblage later in the season if the fields were to remain fallow.

In applying a saturation standard for duration of wetland hydrology, it is appropriate that a 12.5% threshold be applied given the agricultural manipulations and drained condition of the fields.

3.5 Existing Position & Function In Landscape

Project site wetlands were evaluated according to "The Hydrogeomorphic Classification of Wetlands" (Brinson, 1993). The classification system classifies wetlands based on the geomorphic setting, water source and hydrodynamics.

Geomorphic Setting

All of the project site wetlands would be regarded as depressional type wetlands as opposed to riverine or fringe (lake) wetlands. The wetlands are further divided into four subcategories, 1.) wetlands with no apparent inlet or outlet, 2.) wetlands positioned on a local topographic high with only a surface outlet, 3.) wetlands with inlets and outlets and 4.) groundwater slope wetlands. Most of the site wetlands possess two of these subcategories.

Most of the larger wetland areas would be regarded as groundwater slope wetlands without an inlet and outlet. To a degree, all of these wetlands offer temporary storage of floodwaters. Wetlands with no outlets retain inflow and allow filtration while those with inlets and outlets contribute to stream base flow as do groundwater slope wetlands.

Water Sources

Water sources for the project site wetlands include precipitation and groundwater discharge, with a seasonal high water table as the principle source. Groundwater discharge supplies nutrients as it passes through organic and mineral soils and also renews stream base flows where applicable.

Hydrodynamics

The hydrodynamics of the project site wetlands are primarily "vertical fluctuations" as classified by Brinson and are stated as resulting from evapotranspiration and subsequent replacement by precipitation or groundwater discharges. While precipitation is significant, evapotranspiration is also seasonally significant. Vertical fluctuations provide the ability to retain floodwaters so long as capacity is available (conditions not saturated).

4.0 WETLAND FUNCTIONS

4.1 WA Department of Ecology Draft Characterization Inventory Methodology

The wetland functions for the plant site were evaluated according to the WADOE Draft Characterization Inventory Methodology (WADOE Draft Methodology). The system evaluates the following functions: wetland condition, wetland buffer, wildlife habitat, nutrient and sediment entrapment, flood and stormwater desynchronization, groundwater discharge and recharge, support of stream base flow, shoreline stabilization and heritage and cultural value. Fisheries habitat was added as a separate item with use of the Whatcom County assessment. A summary is provided in Table 4-1 and the text below.

Background Conditions

Wetland functions have been altered due to the cleared condition of the site and the ongoing cultivation. The typical crop rotation consists of three years

of growing corn followed by one fallow year. During the crop years, the site is plowed in the spring, followed by manure application and seeding. Herbicide is applied as needed, particularly the season subsequent to the fallow year.

Plant Site

Although the FWP and PC lands are adjacent and sometimes contiguous to the wooded wetland area, only the farmed part was evaluated because that is the part which will be impacted, and also it is distinctly different with respect to land use and the extent of disturbance. However, for the purpose of size and hydrologic functions, the entire wetland area (wooded, shrub, emergent) was considered.

Below is a discussion on the results of the evaluation using the WADOE Draft Methodology.

The overall **wetland condition** rates as *low* for the FWP wetland/PC lands, and the wetland ditch (W) due to the presence of exotic species, hydrologic alterations (ditching/drain tile), agricultural activity (haying, corn), and evidence of pollutants (sedimentation). The **buffer** rates *low* for the wetland ditch (W) due to the adjacent land cover type (corn/pasture). The FWP/PC lands wetland buffers rates as *medium* because it abuts and is part of a wooded and shrub wetland. The **heritage value** of the wetlands rates as *low* due to the absence of a Washington Natural Heritage wetland, mature forested wetland, estuarine wetland, sphagnum bog, fen and the absence of any known endangered, threatened or sensitive species. **Cultural value** rates as *low* for the wetlands due to the poor condition, low habitat value and wetland types, private ownership, lack of access and scenic diversity. High points were assigned for the close proximity to the city.

Wildlife habitat rates as *low* for the wetlands, not including the wooded area. Low points were provided for lack of significant open water and habitat features, single habitat type, simple shape of the wetland and poor condition of the wetland. Medium points were assigned for the FWP's size (when added to the adjacent wooded area), buffer and corridor. According to the assessment, **fisheries habitat** rates as *low* due to the absence of habitat within the pasture setting. The wetland ditch is not known to provide habitat due to the 800 foot length of culvert to the east, and the summer drying of the ditch.

The most significant hydrologic function, which rates as *high*, is related to **entrapment of nutrients and sediments.** The high rating is due to the percent of vegetative cover[1], low flow, slight slopes with constricted outlets and the pollutant (sedimentation) input. **Flood and stormwater retention** rates as *medium* due to the small storage capacity, the low position in the watershed, and the low vegetation density. Additional points were provided for the dense ground cover in the wetland ditch, the connection to Sumas Creek 1,600 feet to the east and size. **Groundwater discharge and recharge** rates as *unlikely* for the wetlands due to the confining nature of the subsoil and the soils being in

[1]Applies to wetland ditch and also when FWP is fallow; does not apply when FWP is in corn.

the hydrologic group "D". The confining layer beneath the wetlands *retards* **groundwater recharge**[2]. The project area is located above the Abbotsford/Sumas aquifer, but is not connected or directly related. The FWP/PC lands and wetland ditch received a *medium* evaluation for **support of stream base flow** because it indirectly *supports* stream flow due to the connection with Johnson Creek. **Shoreline stabilization** is not viewed as being applicable because the wetlands do not possess a shoreline.

TABLE 4-1 - Wetland Functions Comparison Summary[3]

	Plant Site		
Wetland Function	Farmed Wetland Pasture (FWP); PC Lands	Wetland Ditch	8.8 ac. & Mitigation Area (mature)
Wetland Condition	Low	Low	Medium
Buffer	Med	Low	Med
Wildlife Habitat	Low	Low	Medium
Fisheries Habitat	Not applicable	Unlikely	Not applicable
Nutrient/Sediment Entrapment	High	High	High
Flood/Storm Desynchronization	Low	Low	Low-Med
Groundwater Discharge	Unlikely	Unlikely	Unlikely
Groundwater Recharge	Retarded	Retarded	Retarded
Stream Baseflow Support	Unlikely	Possible	Unlikely
Shoreline Stabilization	Not applicable	Not applicable	Not applicable
Cultural Values	Low	Low	Low-Med
Heritage Values	Not applicable	Not applicable	Not applicable

4.2 Wetlands Functional Assessment Methodology

Wetlands located on the plant site wetlands and the west mitigation area were also evaluated according to a Snohomish County functional assessment methodology based on the Wetlands Evaluation Technique (Adamus), and other literature specific to the Pacific northwest and wetland systems. The results of this assessment are provided in Table 4-2.

The wildlife and hydrologic functions evaluated in the WADOE Characterization Inventory are also considered in this assessment, the

[2] The primary source of water for the Sumas Aquifer system is from rainfall on the upland areas to the north and west of the valley. From a regional perspective, available shallow groundwater recharge, although buffered by the low permeability sediments, could contribute 5 to 15 percent of recharge to the aquifer.

[3] Washington Department of Ecology Draft Characterization Inventory Analysis

difference being that the Snohomish County methodology evaluates the ability and the actual opportunity.

This evaluation yielded results somewhat similar to the WADOE Characterization Inventory. Differences include the wetlands high *opportunity* for flood flow alteration. One difference was the *ability* for flood flow alteration, which rated low for the Wetland Ditch due to the unconstricted outlet. The *ability* for the FWP/PC lands and the mitigation area rates as high due to apparent seasonal ponding and restricted outlet.

Stream base flow contribution *potential* rates low due its position in the lower basin. The stream base flow contribution *ability* is medium based on possessing a permanent constricted outlet. Only the ditch has an unrestricted outlet, while the remaining wetlands are restricted by slight topographic variances.

Table 4-2 Plant Site & Mitigation Area Wetland Functions[4]

Function	Farmed Wetland/PC Lands	Wetland Ditch	Mitigation Area
Hydrologic			
Sediment stabilization	1	1	1
Sediment retention	5	5	5
Toxicant retention	5	5	5
Nutrient uptake	3	3	3
Pollution reduction	3	3	3
Flood flow alteration opportunity	5	5	5
Flood flow alteration ability	5	1	5
Stream base flow contribution potential	1	1	1
Stream base flow contribution ability	3	5	3
Groundwater recharge	1	1	1
Percent of 100%	*62*	*60*	*64*
Wildlife Habitat			
Habitat diversity	1 to 3	1	3
Travel corridor	1	1	1
Plant food quality	1	1	5
Occlusion	1	1	5
Habitat features	1	1	3
Wetland edge	1	1	3
Total habitat area	5	5	5
Observed species	1	1	3
Known usage	1	1	1
Sensitive species	1	1	1
Percent of 100%	*28 to 30*	*28*	*60*

With respect to wildlife, the ratings were generally low due to the lack of habitat features, single wetland class, plant food quality (only corn cobs), and

[4] Table 4-2 is a wetland functions summary using the Snohomish County functional assessment methodology based on the Wetlands Evaluation Technique (Adamus). Note that each function evaluated has the potential of receiving 1, 3 or 5 points, with 5 being the highest.

the lack of occlusion. Additional points were provided for the seasonal ponding and the size of the wetland acreage.

The assessment also indicates that Wildlife Functions should increase by 38% as a result of the proposed mitigation plant community, which will offer feeding opportunities, occlusion, habitat and structural diversity.

5.0 WETLAND CATEGORIES

Affected, or potentially affected, wetlands within the City of Sumas were rated according to the 1993 City of Sumas Wetland Ordinance and according to the Washington Department of Ecology Wetlands Rating system (Publication #93-74, 2nd edition) for federal and state permitting. The 1993 City of Sumas Wetland Ordinance Categorization criteria are the same as contained it its 1999 Master Shoreline Program. Affected wetlands outside the City of Sumas were rated only according to the WADOE method. Table 5-1 is a summary of the rating.

City of Sumas

The FWP wetland within the plant site is a Category III or IV Wetland. Although the wetland is connected to the wooded area to the west, it is evaluated separately because of the different habitat type caused by agricultural activity. The wetland lacks open water and has one habitat type dominated with one species. The wetland would apparently qualify as a Category IV Wetland based on the single wetland class and single dominant plant species (corn or reed canary grass/barnyard grass), however its association with the wooded area tends towards a Category III rating.

The wetland ditch in the plant site is a Category III Wetland based on the presence of a single wetland class and a predominance of exotic species (reed canary grass, barnyard grass).

Table 5-1

WETLAND CATEGORY SUMMARY						
Wetland	*Type*	*Community*	*Isolated*	*DOE Pts.*	*City*	*DOE*
FWP/PC	PEM	Corn	No	16	III/IV	III
Wetl. ditch (W)	PEM	Ditch	no	9	III	III
9.4 ac. Wooded Block	PSS/PEM/PFO	Native, invasive	yes	28	III	II

Plant Site

Using the Department of Ecology wetland rating system, the plant site wetlands rated as follows: FWP/PC lands and Wetland Ditch (W) as a Category III Wetlands. Both received significantly less than required 22 points for a Category II rating. The low rating was primarily due to the agricultural and monotypic grass cover that resulted in low habitat features, lack of

structural diversity and species diversity. The wooded block immediately west rated as a Category II Wetland as a result of a 28-point rating.

6.0 ANTICIPATED IMPACTS

6.1 Vegetation Impacts

Plant Site

Developed areas within the plant site will result in the permanent loss of approximately 27.5 acres of agricultural land, mostly planted with corn. The loss will not have significant impacts to wildlife or to other adjacent plant communities due to the disturbed condition of the wetlands and the ongoing nature of those activities, and the availability of similar habitat in areas in the vicinity.

6.2 Wetland & Wetland Buffer Impacts

Plant Site

The project (including the redesigned stormwater detention system) will result in the filling, excavation or culverting of 2.81 acres of palustrine emergent wetlands *confirmed by the NRCS and Corps* (see Appendix G). Of these, 1.81 acres are farmed wetlands (FWP) and 1.0 acre is an approximate 660 linear foot wetland ditch (W). The 1.81 acres of farmed wetlands are located on the east edge of the forested and shrub wetland area. The wetland to be filled consists of the farmed area and reed canary grass to this wetland. The 1.81 acres includes the relocation of 600 linear feet of ditch located parallel to the east edge of the 8.8-acre block preservation area block will require relocation, which is approximately 4,800 square feet and dominated with reed canary grass. Ditch spoils would be temporarily placed on areas already filled, or areas to be filled and then hauled offsite to a nonwetland disposal site (see Table 6-1).

1.0 acre of the wetland ditch is to be backfilled on the plant site and realigned through the south and east edge of the plant site until it intersects and outfalls into the existing culverted part of the ditch. This ditch is dominated by reed canary grass and subdominated by barnyard grass. The 600 foot ditch on the east side of the wooded area is to be relocated around the north and east side of the proposed plant site (see Table 6-1).

Using the revised wetland mapping by Bexar (see Appendix H), which ignores the PC designation, a total of approximately 8.76 acres of FWP, wetlands and PC lands would be filled, excavated or culverted (see Table 6-1). The 1.0-acre wetland ditch (660 feet) and the 600-foot ditch will be relocated as described in the preceding paragraph. This impact acreage includes 0.77 acres of detention pond Cell No. 2 that is below the 38.9-foot permanent pool elevation, although it is to be planted with native shrubs, and therefore, retains wetland attributes.

6.3 Impacted Wetland Functions

The overall **wetland condition**, which rated *low* for the FWP/PC lands and the wetland ditch, *is not considered to be significantly impacted to the extent that mitigation is required.* This due to existing disturbed wetland condition.

The **buffer**, rates *low* for the wetland ditch and *medium* for the FWP where it abuts the wooded and shrub wetland. *Because the wetland ditch and FWP/PC lands will be filled, the buffer becomes irrelevant.*

Agricultural areas are south and east of the wooded areas and provide open areas, but are also a potential source of sedimentation and nutrient input. Hydrology within the wooded area is not expected to be impacted because a drainage ditch on the east side of the wooded area separates it from the plant site from the agricultural area. *That is, the ditch effectively prevents the proposed plant site from contributing surface hydrology to the wooded area. Filling this ditch may actually decrease drainage of the east edge of the wooded area.*

The proposed mitigation south of the wooded area will significantly increase the quality of the wooded area buffer. Wildlife attributes similar to the wooded area will be available, and the potential of agricultural pollutants will be eliminated.

Heritage value and **cultural value** both rate *low*. *These values are not expected to be affected by the proposed wetland fill due to the condition of the wetlands.* The wooded area will be placed into a permanent conservation easement, as well as the proposed mitigation areas. This will increase the overall wooded area and provides the city's population an opportunity to observe the development of the mitigation. *These mitigation areas will increase heritage and cultural values by adding significant shrub and tree areas within the city.*

Wildlife habitat rates as *low* for the wetlands. *The proposed mitigation will not provide the same feeding opportunities for shorebirds, but will provide resting and feeding opportunities for ducks and geese. The mitigation will provide resting, feeding and nesting opportunities for passerines and small mammals. The wildlife opportunities afforded by the proposed mitigation area are considered to be superior to those provided by the agricultural setting. This is because shrub and forested areas offer greater species richness, and other agricultural settings are available nearby and not in short supply.*

According to the assessment, **fisheries habitat** rates as *low* due to the absence of habitat within the pasture setting. This wetland ditch is not known to provide habitat due to the 800-foot length of culvert to the east, and the summer drying of the ditch. *Fisheries habitat is not expected to be impacted.*

The most significant hydrologic functions, which rate as *high*, are related to **entrapment of nutrients and sediments.** The high rating is due to the percent