From:	Jennifer Stanhope
To:	Tiernan Lennon; Sumalee Hoskin
Subject:	MVP effects table and deconstruction: your input
Date:	Tuesday, October 3, 2017 3:17:33 PM
Attachments:	20171003_SWP effects table_deconstruction for MVP 20171002_MVP - Deconstruction per FEIS

Hi Tiernan and Sumalee,

I wrapped up reviewing the deconstruction for MVP that Tiernan had worked on earlier (thanks Tiernan for getting most of it done!)and compared it to the ACP effects table. I've highlighted the rows (in light red) that I think we should remove because they are not proposed for MVP (they are for EEP but we are not consulting on EEP).

Yellow rows I have questions. For communication facilities, they are not proposing putting in a communication tower for MVP. MVP is planning to use VSAT equipment. See my comment in the spreadsheet about it. Based on my initial review of VSATs, I don't think they cause noise or light issues. Are they of concern to bats? Should we leave in the activity or delete it?

Jen

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Analysis of effects on SWP (activities deconstructed for MVP)

New Disturbance - Construction	Vehicle Operation and Foot Traffic	physical impacts to individuals, habitat degradation	crushing, competition, collection, chemical contaminants	introduction of invasive species, poaching, exposure to chemicals from surface water runoff					NLAA	AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Cleared ROW may increase chances of poaching and attract ORV traffic due to increased ease of public access, potentially causing collection, crushing, and death. AMM of installing barriers such as signs, fences, gates, vegetation, or boulders along the ROW to discourage use of ORVs on ROW to avoid illegal access will minimize ORV effects.
New Disturbance - Construction	Clearing - herbaceous vegetation and ground cover	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to evapotranspiration rates and soil moisture, downslope erosion, sedimentation, burial, competition	removal of vegetation in upslope drainage area, erosion, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Soil compaction and clearing of vegetation in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals.
New Disturbance - Construction	Clearing - trees and shrubs	physical impacts to individuals, habitat degradation	changes to sunlight regime, soil compaction, altered hydrology, increased soil temperature, changes to evapotranspiration rates and soil moisture, downslope erosion, sedimentation, burial, competition	removal of over- and mid-story vegetation in upslope drainage area, erosion, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan [SWPCP], Non-Native Invasive Plant Species Management Plan [NNIPSMP]) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Soil compaction and clearing of vegetation in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Removal of mid- and over-story trees will also increase direct and ambient light, which may increase SWP flowering and population size, but beyond an unknown threshold, is anticipated to degrade the SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, thereby affecting SWP as described above. ERM (2017) conducted qualitative analyses of the potential changes to light regime near each colony as a result of tree removal in the pipeline construction ROW using 3D computer modeling. For the Seneca colony, the simulations indicated significant increases in ambient and direct light on the ground and surrounding area during summer, spring, and fall days, although not quantified. For the MNF colony, the simulations indicated changes in ambient light on the ground and surrounding area during early morning on summer and fall days. This light analysis was conducted before the proposed pipeline route was moved 108 ft further from the MNF colony, but we continue to anticipate changes in light in surrounding area due to close proximity (221 ft) of the pipeline construction ROW. The NNIPSMP will not address herbaceous and invasive vegetation growing outside of the ROW and near the SWP colonies due to the increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success. The SWPCP includes temporary AMMs to monitor the population status of the SWP colonies annually for 10 years and to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017). Atlantic is working with the Service and USFS to fund the continuation of population monitoring efforts beyond 1 year post-construction. For the Seneca SWP colony, the SWPCP also includes planting native tree seedlings for 200 ft along the construction ROW edge to the west of the pipeline (e.g., farther from the colony) to ameliorate for changes in sunlight regime and monitoring light levels in the colony for 3 years (e.g., before, during, and 1 year after construction). Approximately 20-30 years after planting, canopy trees (e.g., white oak and eastern white pine found at the Seneca colony) are expected to provide some mid-story shade (Burns et al. 1990), which would contribute to partially restoring the SWP habitat. Based on the evaluation of ERM's (2017) wind analysis of potential changes to wind patterns and speed within a 1 km radius around each of the SWP colonies, we anticipate that changes in wind pattern and speed will be minimal, and are likely to be discountable or insignificant.
New Disturbance - Construction	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	habitat degradation	competition	spread of herbaceous and invasive plant species					NLAA	Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
New Disturbance - Construction	Vegetation Disposal (upland) - brush pile burning	neutral	none						NE	
New Disturbance - Construction	Vegetation Clearing - tree side trimming by bucket truck or helicopter	physical impacts to individuals, habitat degradation	changes to sunlight regime, increased soil temperature, changes to evapotranspiration rates and soil moisture, competition	trimming of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	Trimming of mid- and over-story trees will increase direct and ambient light, which may increase SWP flowering and population size. Beyond an unknown threshold, an increase in direct and ambient light is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of ROW and near SWP colonies due to increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The Small Whorled Pogonia Conservation Plan includes temporary AMMs to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (VHB 2017).
New Disturbance - Construction	Grading, erosion control devices	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial	grading in upslope drainage area, erosion	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan) will minimize potential effects from surface water runoff. Soil compaction and ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals.
New Disturbance - Construction	Trenching (digging, blasting, dewatering, open trench, sedimentation)	physical impacts to individuals, habitat degradation	crushing, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial	trenching in upslope drainage area, erosion, movement of soil and larger material (e.g. boulders) when blasting	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan) will minimize potential effects from surface water runoff. Ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Blasting may also loosen large rocks, which could fall and crush SWP.
New Disturbance - Construction	Pipe Stringing - bending, welding, coating, padding and backfilling	neutral	none						NE	No impacts to SWP habitat are anticipated from this action.
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge), new line	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Regrading and Stabilization - restoration of corridor	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial, competition, increased nutrients, chemical contaminants	regrading in upslope drainage area, erosion, spread of herbaceous and invasive plant species, exposure to nutrients from storm water runoff (fertilizers, decomposed vegetation), exposure to chemicals from surface water runoff and wind	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan [NNIPSMP]) will minimize potential effects from surface water runoff, soil compaction, and competition from invasive plants in ROW. Ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. For controlling invasive plants, hand application methods will be used along the ROW and no herbicides will be applied within 25 ft of federally listed plant species unless approved by the Service or USFS. In addition, SWP are located at least 70 ft from the ROW and therefore are not likely to be exposed to herbicides.
New Disturbance - Construction	Compression Facility, noise	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Communication Facility - ~~guy lines,~~ noise, lights??	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - grading, graveling	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - culvert installation	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent- tree trimming and tree removal	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Stream Crossings, wet open cut ditch	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, flume	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, dam & pump	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, cofferdam	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, Horizontal Directional Drill (HDD)	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, conventional bore	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, direct pipe	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Equipment Crossing Structures	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.

New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - clearing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - tree side trimming	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - grading, trenching, regrading	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - pipe stringing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - HDD	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - Horizontal bore	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Facilities - vehicles, foot traffic, noise, ~~communication facilities~~?	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Vegetation Management - mowing	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to evapotranspiration rates and soil moisture, downslope erosion, burial, competition	removal of vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and removal of vegetation in the upslope drainage area will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranpiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
Operation & Maintenance	Vegetation Management - chainsaw and tree clearing	physical impacts to individuals, habitat degradation	changes to sunlight regime, soil compaction, altered hydrology, increased soil temperature, changes to evapotranspiration rates and soil moisture, downslope erosion, burial, competition	removal of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and removal of vegetation in the upslope drainage area will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranpiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. This subactivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the colonies. Depending on the degree of surface water runoff and sedimentation, SWP habitat may be degraded and individual stems may be buried. Removal of mid- and over-story trees will also increase direct and ambient light, which may increase SWP flowering and population size, but beyond an unknown threshold, is anticipated to degrade the SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individual SWP. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of the ROW and near the SWP colonies due to the increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The SWP Conservation Plan includes temporary AMMs to monitor the population status of the SWP colonies annually for 10 years post-construction and to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017). Atlantic is working with the Service and USFS to fund the continuation of population monitoring efforts beyond 1 year post-construction.
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	physical impacts to individuals, habitat alteration	chemical contaminants	exposure to chemicals from surface water runoff and wind					NLAA	Hand application methods will be used along the ROW and no herbicides will be applied within 25 ft of federally listed plant species unless approved by the Service or USFS. In addition, SWP are located at least 70 ft from the ROW and therefore are not likely to be exposed to herbicides. The SWP Conservation Plan also includes AMMs to minimize herbicide exposure by prohibiting herbicide use within 60 ft of SWP colonies and only using handpulling within this area (VHB 2017).
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	habitat degradation	competition	spread of herbaceous and invasive plant species					NLAA	Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Vegetation Management - tree side trimming by bucket truck or helicopter	habitat degradation	changes to sunlight regime, increased soil temperature, changes to evapotranspiration rates and soil moisture, competition	trimming of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	Trimming of mid- and over-story trees will increase direct and ambient light, which may increase SWP flowering and population size. Beyond an unknown threshold, an increase in direct and ambient light is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of ROW and near SWP colonies due to increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The SWP Conservation Plan includes temporary AMMs to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017).
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, burial, sedimentation	regrading in upslope drainage area, erosion	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and ground disturbance will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranpiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. This subactivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the colonies. Depending on the degree of surface water runoff and sedimentation, SWP habitat may be degraded and individual stems may be buried.
Operation & Maintenance	ROW repair, regrading, revegetation (wetland) - hand, mechanical	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	ROW repair, regrading, revegetation - instream stabilization and/or fill	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	Access Road Maintenance - grading, graveling	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
Operation & Maintenance	Access Road Maintenance - culvert replacement	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - Off ROW Clearing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - trenching, anode, bell hole	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Inspection Activities - ground and aerial	neutral	none						NE	No impacts to SWP habitat are anticipated from this action.

BLACK text = Activities that are only included in the ACP FEIS
RED text = Activities that are included in both the ACP and MVP FEIS
BLUE text = Activities that are only included in the MVP FEIS

1. Survey and staking
    a. Notify landowners
    b. Drive ATVs and pick-up trucks
        i. Stake limits of construction ROW
        ii. Stake centerline of proposed trench
        iii. Stake ATWS and other approved areas
        iv. Mark approved roads
            1. Mark areas to be widened
        v. Mark environmentally sensitive areas
            1. Waterbodies
            2. Cultural resources
            3. Sensitive species
        vi. Reference and mark old survey monuments
2. Clearing and grading
    a. Contact one-call system for individual state
        i. Identify and flag existing utilities
    b. Mobilize construction areas
        i. Fence along the ROW
            1. Cut and brace fence
            2. Existing fences may not be removed, but new gates may be cut, and fences reinforced.
            1. Install temporary gates and fences around livestock
    b. Clear and grade vegetation (trees, shrubs, brush, roots, large rocks)
        i. Cut vegetation
        ii. Scrape level with ground leaving rootstock “where possible”
            1. Burn stumps
            2. Chip stumps/trees
            3. Haul debris off site
            4. Open burn brush (on site specific basis, in accordance with state and local regulations and Mountain Valley’s Fire Prevention and Suppression Plan. Burning of cleared slash would only take place in upland areas, away from residences, waterbodies, and wetlands. No burning would be done within the Jefferson National Forest.
            5. Place timber, brush, and other materials cleared alongside construction ROW for beneficial reuse, stabilization, habitat restoration per landowner approval
    c. Level the ROW surface through grading
        i. Equipment used for clearing and grading activities could include grinding machines, motor-graders, bulldozers, track-hoes, and dump trucks.

ii. Separate topsoil from subsoil
    1. Treat topsoil containing invasive species
iii. Peel and remove vegetation mat (topsoil) from ground in areas not requiring grading
iv. Install erosion controls

2. Access road construction/improvement
    a. Install culverts within waterbodies along permanent access roads

3. Trenching
    a. Removal soil and bedrock
        i. Use heavy equipment
            1. Use rotary trenching machine
            2. Use track mounted excavator
            3. Use tractor-mounted mechanical rippers/hydraulic hoe-rams/rock trenchers to fracture rock
        ii. Utilize trench blasting techniques where equipment cannot remove rock
            1. Mass rock blasting
            2. Production blasting
    b. Dig trench to average depth of 5.5 to 9 feet (may vary based on terrain and landowner requests)
    c. Pile spoil material to one side of trench
    d. Dewater pipeline trench in areas of high water table or after heavy precipitation events
        i. Discharge water into energy dissipation/sediment filtration device in well-vegetated upland areas away from waterbodies and wetlands.
            1. Geotextile bag filtration
            2. If adequate vegetation is absent, then will use straw bale filtration
        ii. Filter any contaminated water per contaminated media plan
4. Pipe stringing, bending, welding, coating
    a. Haul pipe by tractor trailer in 40-60 foot lengths (joints) from yards to ROW
    b. Off load from truck and place next to trench
        i. Use heavy equipment
        ii. Set pipes on temporary supports/wooden skids
    c. Line pipes end to end - string beside the trench in a continuous line
    d. Bend pipe where necessary to fit trench
        i. Use heavy equipment
    e. Weld pipe ends together
        i. Examine welds
        ii. Sandblast/clean area around weld
        iii. Coat area around weld with additional epoxy to protect from corrosion
    f. Visually inspect pipes
        i. Repair any damage found (welding/painting/coating)
5. Lowering-in and Backfilling
    a. Inspect trench

i. Remove any rocks or debris
ii. Dewater (as noted above)
iii. Pad rocky areas at base of trench

b. Lower pipe into trench
i. Use heavy equipment

c. Make final tie-in welds while pipe is in trench

d. Install trench breaker (to prevent water movement within trench)

e. Deposit fill material into trench
i. Do not leave crown >1 foot

f. Spread additional topsoil across ROW
i. Inspect for compaction (see test soil compaction below) and scarify as necessary

6. Internal pipe cleaning and hydrostatic testing
a. Clean pipe
i. Install manifold on one end and send cleaning pig through with compressed air

b. Hydrostatic test of pipe
i. Obtain test water from surface waterbodies (2 in WV) and municipal sources
1. Store water in tanks prior to pumping into pipe
2. If surface water, withdrawal devices in streams will remove water
a. Place water in temporary holding pools
b. Truck water to test site
3. Collect baseline water samples prior to withdrawal and discharge
4. If municipal, fill truck
a. Truck water to test site

ii. Add a biocide to surface waters used for hydrostatic testing
1. Prior to discharge, a biocide deactivating agent would be added so the test water could be discharge to a vegetated upland area.

iii. Fill segments with pressurized water

iv. Leave for set number of hours to confirm integrity
1. Repair leaks and retest as necessary

v. Release pressure

vi. Remove water from pipe
1. Discharge water per plans (over vegetated land surfaces through energy dissipation device, filter bags, or haybale-lined dewatering structures, typically in same watershed as source)

7. Commissioning
a. Verify equipment is properly installed and working
b. Verify communications systems and controls are functioning
c. Purge pipeline of air
d. Fill with natural gas

8. Cleanup and Restoration
a. Grade and restore original contours

b. Use heavy equipment
c. Grade and restore original drainage patterns
d. Install permanent slope breakers and diversion berms
e. restore/reinstall fences, sidewalks, driveways, stone walls
f. Install permanent erosion controls
g. Test soil compaction
h. Mountain Valley would decompact all disturbed areas by discing. Compaction testing would be left to the discretion of the EI except for in agricultural and residential areas where Mountain Valley's EIs would conduct topsoil and subsoil compaction tests using a penetrometer or other appropriate device at regular intervals.
i. Spread cut vegetation on areas of ROW to stabilize
j. Remove excess debris from ROW
k. Remove rocks/stone
l. Seed ROW
m. Install markers indicating pipeline location underground
n. Disturbed areas would be monitored for at least the first and second growing seasons after construction

SPECIAL CONSTRUCTION PROCEDURES

1. Waterbody Crossings
    a. Wet open-cut
        i. Excavate trench
            1. Use heavy equipment
                a. In-stream equipment
                b. Out-of-stream equipment
        ii. Install pipeline
            1. Use heavy equipment to lower into trench
        iii. Backfill trench
            1. Use heavy equipment
        iv. Recontour
        v. Stabilize
        vi. Install E&S controls
    b. Flume
        i. Place flume pipes in waterbody
        ii. Place sand bags or dam diversion structure upstream and downstream of trench area to divert water flow around trench area
        iii. Excavate trench
            1. Use heavy equipment
                a. In-stream equipment
                b. Out-of-stream equipment
        iv. Install pipeline
            1. Use heavy equipment to lower into trench
        v. Backfill trench
            1. Use heavy equipment

Commented [WVFO1]: MVP does not propose any wet open-cuts

vi. Remove dam diversion/sand bags
vii. Remove flume pipes
viii. Recontour
ix. Stabilize
x. Install E&S controls

c. Dam and Pump
   i. Place sandbags or clean gravel with plastic liner upstream and downstream of trench area to isolate trench area
      1. Install diversion structure in stream at downstream side to dissipate discharged water
   ii. Pump water out of trench area and dispose in downstream area
   iii. Excavate trench
      1. Use heavy equipment
         a. In-stream equipment
         b. Out-of-stream equipment
   iv. Install pipeline
      1. Use heavy equipment to lower into trench
   v. Backfill trench
      1. Use heavy equipment
   vi. Remove pumps
   vii. Remove dam diversion/sand bags
   viii. Recontour
   ix. Stabilize
   x. Install E&S controls

d. Cofferdam
   i. Install temporary diversion structure in stages. It could take 2 or more stages to complete the crossing.
   ii. Install pumps
   iii. Pump water from inside diversion structure
   iv. Excavate trench
      1. Use heavy equipment
         a. In-stream equipment
         b. Out-of-stream equipment
   v. Install pipeline
      1. Use heavy equipment to lower into trench
   vi. Backfill trench
      1. Use heavy equipment
   vii. Remove pumps
   viii. Remove diversion structure
   ix. Move to other side of waterbody and repeat steps i. through vii.
   x. Recontour
   xi. Stabilize
   xii. Install E&S controls

e. Conventional bore

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i. Excavate bore pits on either side of the resource
    1. Grade pits to match proposed slope of pipeline
    2. Install sheet pile to maintain integrity of bore pit if necessary
    3. Utilize dewatering pumps in hole if necessary
ii. Use bore machine within pit to bore tunnel under the resource
    1. Use heavy equipment with cutting head mounted on auger
iii. Push prefabricated section of pipe through the borehole
    1. Weld pipe together prior to pushing through (if necessary)
iv. Backfill borehole
v. Recontour
vi. Stabilize
vii. Install E&S controls

f. HDD (geotechnical borings, resistivity imagery, seismic refraction studies were completed at entry and exit holes)

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i. Drill pilot hole from one side of crossing to other
    1. Use heavy equipment
    2. Use bentonite clay + water pressurized slurry to lubricate reaming tools
ii. Enlarge pilot hole with repeat passes of larger reaming tools
iii. Attach pipe segment to drill on far side and pull segment through pilot hole
iv. Weld pipe segment to rest of pipeline
v. Refill and recontour any holes on landscape
vi. Stabilize
vii. Install E&S controls

g. Direct Pipe (similar to HDD; contingency plan for HDD crossings)
    i. Hole boring with microtunneler

2. Wetland Crossings
    a. Wet or dry open trench
    b. Open-ditch push-pull method
3. Steep Slope Areas (Rugged Topography)
    a. E&S control installation
        i. Slope breakers
            1. Compacted earth
            2. Sandbags
        ii. Trench plugs at entrance/exit of waterbodies/wetlands
            1. Compacted earth
            2. Sandbags
            3. Foam (if permanent plug)
            4. Cement (if permanent plug)
        iii. Super silt fence
        iv. Erosion control matting
        v. Hydromulching
        vi. Rock

    b. Winching
        i. Heavy equipment
    c. Excavate trench
4. Karst Terrain
    a. Deployment of karst specialist to evaluate areas of potential karst to and during construction
    b. Conduct inspections (e.g. subsidence, rock collapse, sediment filling, etc)
    c. Monitoring during and post-construction for any subsidence or karst hazards
5. Winter Construction
    a. Snow plowing equipment
    b. Safety fencing and around open trenches
    c. Suspension of backfill – frozen conditions
    d. Mulch and erosion and sedimentation devices
    e. Delaying final clean up

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Commented [WVFO5]: This is as far as I got in the deconstruction

BLACK text = Activities that are only included in the ACP FEIS
RED text = Activities that are included in both the ACP and MVP FEIS
BLUE text = Activities that are only included in the MVP FEIS

1. Survey and staking
    a. Notify landowners
    b. Drive ATVs and pick-up trucks
        i. Stake limits of construction ROW
        ii. Stake centerline of proposed trench
        iii. Stake ATWS and other approved areas
        iv. Mark approved roads
            1. Mark areas to be widened
        v. Mark environmentally sensitive areas
            1. Waterbodies
            2. Cultural resources
            3. Sensitive species
        vi. Reference and mark old survey monuments
2. Clearing and grading
    a. Contact one-call system for individual state
        i. Identify and flag existing utilities
    b. Mobilize construction areas
        i. Fence along the ROW
            1. Cut and brace fence
            2. Existing fences may not be removed, but new gates may be cut, and fences reinforced.
            1. Install temporary gates and fences around livestock
    b. Clear and grade vegetation (trees, shrubs, brush, roots, large rocks)
        i. Cut vegetation
        ii. Scrape level with ground leaving rootstock “where possible”
            1. Burn stumps
            2. Chip stumps/trees
            3. Haul debris off site
            4. Open burn brush (on site specific basis, in accordance with state and local regulations and Mountain Valley’s Fire Prevention and Suppression Plan. Burning of cleared slash would only take place in upland areas, away from residences, waterbodies, and wetlands. No burning would be done within the Jefferson National Forest.
            5. Place timber, brush, and other materials cleared alongside construction ROW for beneficial reuse, stabilization, habitat restoration per landowner approval
    c. Level the ROW surface through grading
        i. Equipment used for clearing and grading activities could include grinding machines, motor-graders, bulldozers, track-hoes, and dump trucks.

ii. Separate topsoil from subsoil
    1. Treat topsoil containing invasive species
iii. Peel and remove vegetation mat (topsoil) from ground in areas not requiring grading
iv. Install erosion controls

2. Access road construction/improvement
    a. Install culverts within waterbodies along permanent access roads

3. Trenching
    a. Removal soil and bedrock
        i. Use heavy equipment
            1. Use rotary trenching machine
            2. Use track mounted excavator
            3. Use tractor-mounted mechanical rippers/hydraulic hoe-rams/rock trenchers to fracture rock
        ii. Utilize trench blasting techniques where equipment cannot remove rock
            1. Mass rock blasting
            2. Production blasting
    b. Dig trench to average depth of 5.5 to 9 feet (may vary based on terrain and landowner requests)
    c. Pile spoil material to one side of trench
    d. Dewater pipeline trench in areas of high water table or after heavy precipitation events
        i. Discharge water into energy dissipation/sediment filtration device in well-vegetated upland areas away from waterbodies and wetlands.
            1. Geotextile bag filtration
            2. If adequate vegetation is absent, then will use straw bale filtration
        ii. Filter any contaminated water per contaminated media plan
4. Pipe stringing, bending, welding, coating
    a. Haul pipe by tractor trailer in 40-60 foot lengths (joints) from yards to ROW
    b. Off load from truck and place next to trench
        i. Use heavy equipment
        ii. Set pipes on temporary supports/wooden skids
    c. Line pipes end to end - string beside the trench in a continuous line
    d. Bend pipe where necessary to fit trench
        i. Use heavy equipment
    e. Weld pipe ends together
        i. Examine welds
        ii. Sandblast/clean area around weld
        iii. Coat area around weld with additional epoxy to protect from corrosion
    f. Visually inspect pipes
        i. Repair any damage found (welding/painting/coating)
5. Lowering-in and Backfilling
    a. Inspect trench

i. Remove any rocks or debris
ii. Dewater (as noted above)
iii. Pad rocky areas at base of trench

b. Lower pipe into trench
i. Use heavy equipment

c. Make final tie-in welds while pipe is in trench

d. Install trench breaker (to prevent water movement within trench)

e. Deposit fill material into trench
i. Do not leave crown >1 foot

f. Spread additional topsoil across ROW
i. Inspect for compaction (see test soil compaction below) and scarify as necessary

6. Internal pipe cleaning and hydrostatic testing
a. Clean pipe
i. Install manifold on one end and send cleaning pig through with compressed air

b. Hydrostatic test of pipe
i. Obtain test water from surface waterbodies (2 in WV) and municipal sources
1. Store water in tanks prior to pumping into pipe
2. If surface water, withdrawal devices in streams will remove water
a. Place water in temporary holding pools
b. Truck water to test site
3. Collect baseline water samples prior to withdrawal and discharge
4. If municipal, fill truck
a. Truck water to test site

ii. Add a biocide to surface waters used for hydrostatic testing
1. Prior to discharge, a biocide deactivating agent would be added so the test water could be discharge to a vegetated upland area.

iii. Fill segments with pressurized water
iv. Leave for set number of hours to confirm integrity
1. Repair leaks and retest as necessary

v. Release pressure
vi. Remove water from pipe
1. Discharge water per plans (over vegetated land surfaces through energy dissipation device, filter bags, or haybale-lined dewatering structures, typically in same watershed as source)

7. Commissioning
a. Verify equipment is properly installed and working
b. Verify communications systems and controls are functioning
c. Purge pipeline of air
d. Fill with natural gas

8. Cleanup and Restoration
a. Grade and restore original contours

b. Use heavy equipment
c. Grade and restore original drainage patterns
d. Install permanent slope breakers and diversion berms
e. restore/reinstall fences, sidewalks, driveways, stone walls
f. Install permanent erosion controls
g. Test soil compaction
h. Mountain Valley would decompact all disturbed areas by discing. Compaction testing would be left to the discretion of the EI except for in agricultural and residential areas where Mountain Valley's EIs would conduct topsoil and subsoil compaction tests using a penetrometer or other appropriate device at regular intervals.
i. Spread cut vegetation on areas of ROW to stabilize
j. Remove excess debris from ROW
k. Remove rocks/stone
l. Seed ROW
m. Install markers indicating pipeline location underground
n. Disturbed areas would be monitored for at least the first and second growing seasons after construction

SPECIAL CONSTRUCTION PROCEDURES

1. Waterbody Crossings
    a. Wet open-cut
        i. Excavate trench
            1. Use heavy equipment
                a. In-stream equipment
                b. Out-of-stream equipment
        ii. Install pipeline
            1. Use heavy equipment to lower into trench
        iii. Backfill trench
            1. Use heavy equipment
        iv. Recontour
        v. Stabilize
        vi. Install E&S controls
    b. Flume
        i. Place flume pipes in waterbody
        ii. Place sand bags or dam diversion structure upstream and downstream of trench area to divert water flow around trench area
        iii. Excavate trench
            1. Use heavy equipment
                a. In-stream equipment
                b. Out-of-stream equipment
        iv. Install pipeline
            1. Use heavy equipment to lower into trench
        v. Backfill trench
            1. Use heavy equipment

Commented [WVFO1]: MVP does not propose any wet open-cuts

vi. Remove dam diversion/sand bags
vii. Remove flume pipes
viii. Recontour
ix. Stabilize
x. Install E&S controls

c. Dam and Pump
   i. Place sandbags or clean gravel with plastic liner upstream and downstream of trench area to isolate trench area
      1. Install diversion structure in stream at downstream side to dissipate discharged water
   ii. Pump water out of trench area and dispose in downstream area
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Analysis of effects on SWP (activities deconstructed for MVP)

New Disturbance - Construction	Vehicle Operation and Foot Traffic	physical impacts to individuals, habitat degradation	crushing, competition, collection, chemical contaminants	introduction of invasive species, poaching, exposure to chemicals from surface water runoff					NLAA	AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Cleared ROW may increase chances of poaching and attract ORV traffic due to increased ease of public access, potentially causing collection, crushing, and death. AMM of instlalling barriers such as signs, fences, gates, vegetation, or boulders along the ROW to discourage use of ORVs on ROW to avoid illegal access will minimize ORV effects.
New Disturbance - Construction	Clearing - herbaceous vegetation and ground cover	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to evapotranspiration rates and soil moisture, downslope erosion, sedimentation, burial	removal of vegetation in upslope drainage area, erosion, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Soil compaction and clearing of vegetation in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals.
New Disturbance - Construction	Clearing - trees and shrubs	physical impacts to individuals, habitat degradation	changes to sunlight regime, soil compaction, altered hydrology, increased soil temperature, changes to evapotranspiration rates and soil moisture, downslope erosion, sedimentation, burial, competition	removal of over- and mid-story vegetation in upslope drainage area, erosion, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan [SWPCP], Non-Native Invasive Plant Species Management Plan [NNIPSMP]) will minimize potential effects from surface water runoff and competition from invasive plants in ROW. Soil compaction and clearing of vegetation in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These changes are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Removal of mid- and over-story trees will also increase direct and ambient light, which may increase SWP flowering and population size, but beyond an unknown threshold, is anticipated to degrade the SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, thereby affecting SWP as described above. ERM (2017) conducted qualitative analyses of the potential changes to light regime near each colony as a result of tree removal in the pipeline construction ROW using 3D computer modeling. For the Seneca colony, the simulations indicated significant increases in ambient and direct light on the ground and surrounding area during summer, spring, and fall days, although not quantified. For the MNF colony, the simulations indicated changes in ambient light on the ground and surrounding area during early morning on summer and fall days. This light analysis was conducted before the proposed pipeline route was moved 108 ft further from the MNF colony, but we continue to anticipate changes in light in surrounding area due to close proximity (221 ft) of the pipeline construction ROW. The NNIPSMP will not address herbaceous and invasive vegetation growing outside of the ROW and near the SWP colonies due to the increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success. The SWPCP includes temporary AMMs to monitor the population status of the SWP colonies annually for 10 years and to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017). Atlantic is working with the Service and USFS to fund the continuation of population monitoring efforts beyond 1 year post-construction. For the Seneca SWP colony, the SWPCP also includes planting native tree seedlings for 200 ft along the construction ROW edge to the west of the pipeline (e.g., farther from the colony) to ameliorate for changes in sunlight regime and monitoring light levels in the colony for 3 years (e.g., before, during, and 1 year after construction). Approximately 20-30 years after planting, canopy trees (e.g., white oak and eastern white pine found at the Seneca colony) are expected to provide some mid-story shade (Burns et al. 1990), which would contribute to partially restoring the SWP habitat. Based on the evaluation of ERM's (2017) wind analysis of
New Disturbance - Construction	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	habitat degradation	competition	spread of herbaceous and invasive plant species					NLAA	Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
New Disturbance - Construction	Vegetation Disposal (upland) - brush pile burning	neutral	none						NE	
New Disturbance - Construction	Vegetation Clearing - tree side trimming by bucket truck or helicopter	physical impacts to individuals, habitat degradation	changes to sunlight regime, increased soil temperature, changes to evapotranspiration rates and soil moisture, competition	trimming of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	Trimming of mid- and over-story trees will increase direct and ambient light, which may increase SWP flowering and population size. Beyond an unknown threshold, an increase in direct and ambient light is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of ROW and near SWP colonies due to increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The Small Whorled Pogonia Conservation Plan includes temporary AMMs to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (VHB 2017).
New Disturbance - Construction	Grading, erosion control devices	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial	grading in upslope drainage area, erosion	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan) will minimize potential effects from surface water runoff. Soil compaction and ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and
New Disturbance - Construction	Trenching (digging, blasting, dewatering, open trench, sedimentation)	physical impacts to individuals, habitat degradation	crushing, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial	trenching in upslope drainage area, erosion, movement of soil and larger material (e.g. boulders) when blasting	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan) will minimize potential effects from surface water runoff. Ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Blasting may also loosen large rocks, which could fall and crush SWP
New Disturbance - Construction	Pipe Stringing - bending, welding, coating, mainline and backfillinr	neutral	none						NE	No impacts to SWP habitat are anticipated from this action.
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge), new line	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Regrading and Stabilization - restoration of corridor	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, sedimentation, burial, competition, increased nutrients, chemical contaminants	regrading in upslope drainage area, erosion, spread of herbaceous and invasive plant species, exposure to nutrients from storm water runoff (fertilizers, decomposed vegetation), exposure to chemicals from surface water runoff and wind	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline construction ROW will affect 17.0 and 12.7%, respectively, of the Seneca and MNF colonies' upslope drainage areas. AMMs (e.g., Upland Erosion Control Plan, Restoration and Rehabilitation Plan, temporary diversion channels and berms in SWP Conservation Plan, Non-Native Invasive Plant Species Management Plan [NNIPSMP]) will minimize potential effects from surface water runoff, soil compaction, and competition from invasive plants in ROW. Ground disturbance in the upslope drainage area and diversion of surface water flow away from SWP colonies will alter the surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture of the SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. For controlling invasive plants, hand application methods will be used along the ROW and no herbicides will be applied within 25 ft of federally listed plant species unless approved by the Service or USFS. In addition, SWP are located at least 70 ft from the ROW and therefore are not likely to be exposed to herbicides
New Disturbance	Compression Facility, noise	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance	Communication Facility - ~~per line,~~ noise, light??	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Access Roads - upgrading exisiting roads, new roads temp and permanent - gradine.	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Access Roads - upgrading exisiting roads, new roads temp and permanent - culvert	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Access Roads - upgrading exisiting roads, new roads temp and permanent- tree trimming and tree removal	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
New Disturbance - Construction	Stream Crossings, wet open cut ditch	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, flume	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, dam & pump	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, cofferdam	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, Horizontal Directional Drill (HDD)	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, conventional bore	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Crossings, direct pipe	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Stream Equipment Crossing Structures	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - clearing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - tree side trimming	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - grading, trenching,	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - pipe stringing	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - HDD	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - Horizontal bore	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Facilities - vehicles, foot traffic, noise, ~~communication facilities~~?	neutral	none						NE	Facilities do not occur within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Vegetation Management - mowing	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to evapotranspiration rates and soil moisture, downslope erosion, burial	removal of vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and removal of vegetation in the upslope drainage area will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
Operation & Maintenance	Vegetation Management - chainsaw and tree clearing	physical impacts to individuals, habitat degradation	changes to sunlight regime, soil compaction, altered hydrology, increased soil temperature, changes to evapotranspiration rates and soil moisture, downslope erosion, burial, competition	removal of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and removal of vegetation in the upslope drainage area will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. This subactivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the colonies. Depending on the degree of surface water runoff and sedimentation, SWP habitat may be degraded and individual stems may be buried. Removal of mid- and over-story trees will also increase direct and ambient light, which may increase SWP flowering and population size, but beyond an unknown threshold, is anticipated to degrade the SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individual SWP. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of the ROW and near the SWP colonies due to the increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The SWP Conservation Plan includes temporary AMMs to monitor the population status of the SWP colonies annually for 10 years post-construction and to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB 2017). Atlantic is working with the Service and USFS to fund the continuation of
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	physical impacts to individuals, habitat	chemical contaminants	exposure to chemicals from surface water runoff and wind					NLAA	Hand application methods will be used along the ROW and no herbicides will be applied within 25 ft of federally listed plant species unless approved by the Service or USFS. In addition, SWP are located at least 70 ft from the ROW and therefore are not likely to be exposed to herbicides. The SWP Conservation Plan also includes AMMs to minimize herbicide exposure by prohibiting herbicide use within 60 ft of SWP colonies and only using handpulling within this area (VHB 2017).
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	habitat degradation	competition	spread of herbaceous and invasive plant species					NLAA	Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species.
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Vegetation Management - tree side trimming by bucket truck or helicopter	habitat degradation	changes to sunlight regime, increased soil temperature, changes to evapotranspiration rates and soil moisture, competition	trimming of over- and mid-story vegetation in upslope drainage area, spread of herbaceous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	Trimming of mid- and over-story trees will increase direct and ambient light, which may increase SWP flowering and population size. Beyond an unknown threshold, an increase in direct and ambient light is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, causing decreased fitness and reproductive success and possibly death of individuals. Methods described in the Non-Native Invasive Plant Species Management Plan will minimize impacts due to invasive species in the ROW, but not address herbaceous and invasive vegetation growing outside of ROW and near SWP colonies due to increased light. Invasive species could compete with SWP for light, space, and nutrients, causing decreased fitness and reproductive success and possibly death of individual SWP. The SWP Conservation Plan includes temporary AMMs to minimize effects from invasive species outside of the ROW and near the SWP colonies for 3 years (e.g., before, during, and 1 year after construction) (VHB
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	physical impacts to individuals, habitat degradation	soil compaction, altered hydrology, changes to soil moisture, downslope erosion, burial, sedimentation	regrading in upslope drainage area, erosion	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This subactivity in the pipeline permanent ROW will affect 17.0 and 1.1%, respectively, of the Seneca and MNF colonies' upslope drainage areas. Soil compaction and ground disturbance will increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed of the colonies, causing changes in evapotranspiration rates and soil moisture in SWP habitat downslope of the ROW. These stressors are likely to affect both the mycorrhizal fungi and SWP and cause decreased fitness and reproductive success and possibly death of SWP individuals. This subactivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the colonies. Depending on the degree of surface water runoff and sedimentation, SWP habitat may
Operation & Maintenance	ROW repair, regrading, revegetation (wetland) - hand, mechanical	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	ROW repair, regrading, revegetation - instream stabilization and/or fill	neutral	none						NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	Access Road Maintenance - grading, eaveline	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
Operation & Maintenance	Access Road Maintenance - culvert replacement	neutral	none						NE	No temporary or permanent access roads proposed near SWP colonies.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - OJF ROW	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - trenching, anode,	neutral	none						NE	Activity not proposed within the upslope drainage area and 100-ft buffer downslope of SWP colonies.
Operation & Maintenance	Inspection Activities - ground and aerial	neutral	none						NE	No impacts to SWP habitat are anticipated from this action.