



October 11, 2017

Robert Vogt, M.S.  
Senior Biologist  
Pacific Gas & Electric Company  
Environmental - Gas Transmission  
6111 Bollinger Canyon Road  
San Ramon, CA 94583

Technical Memorandum –Seed Mix Revisions and Sources for Approval by SFPUC and CDFW - Pacific Gas and Electric Company (PG&E) Gas Transmission Line 109 Crystal Springs Pipeline Replacement Project

Dear Mr. Vogt,

This Technical Memorandum includes details about the proposed seed mixes that will be used for restoration of the Pacific Gas and Electric Company (PG&E) Gas Transmission Line 109 Crystal Springs Pipeline Replacement Project and other PG&E projects on SFPUC property in 2017. These seed mixes were listed in the Vegetation Restoration Plan (VRP; Nomad 2017) for the project. The VRP states that any modifications to the seed mixes as listed in the VRP will be submitted to CDFW and SFPUC to approve the changes. Subsequent to the preparation of the VRP, the final amount of seed available from field production was calculated and minor adjustments to the final VRP seed mix is required. Seed mixes were revised based on seed availability. In addition, a few of the seed lots contained unacceptable weed species and were rejected for use by SFPUC.

Tables 1-4 in Attachment A show the original seed mix contained in the VRP and the proposed seed mix change for each habitat. Tables 1 through 4 also note the location seed was collected from and if the seed was amplified (grown) or purchased. Tables 1-4 in Attachment B show the final proposed seed mixes (without original seed mix and rationale for change).

Please feel free to call me at (925) 228-1027 if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Erin L. McDermott". The signature is written in a cursive, flowing style.

Erin L. McDermott  
Principal  
ISA Certified Arborist – WE7318A  
Botanist, Wetland & GIS Specialist  
Nomad Ecology, LLC

**Attachment:**

**ATTACHMENT A: APPROVED SEED MIXES AND PROPOSED CHANGES**

**ATTACHMENT B: FINAL PROPOSED SEED MIXES**

**ATTACHMENT A: APPROVED SEED MIXES AND PROPOSED CHANGES**

**Table 1. Serpentine Grassland Seed Mix**

SPECIES	VRP SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	REVISED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE	REASON FOR CHANGE
yarrow <i>Achillea millefolium</i>	0.5	2*	PG&E Locally Collected Seed**, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
Chilean trefoil <i>Acmispon wrangelianus</i>	2	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Seed was rejected due to weed content of seed lot.
four-spot <i>Clarkia purpurea</i> var. <i>quadrivulnera</i>	0.5	0.5	Santa Clara County Open Space, purchased from Pacific Coast Seed	N/A
California poppy <i>Eschscholzia californica</i>	0.5	2*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
small fescue <i>Festuca microstachys</i>	10	10	PG&E Locally Collected Seed, amplified by S&S Seeds	N/A
meadow barley <i>Hordeum brachyantherum</i>	3	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Field amplification yields were lower than originally estimated. Sufficient seed is not available.
goldfields <i>Lasthenia gracilis</i>	0.5	0*	Santa Clara County, Coyote Valley serpentines, purchased from Pacific Coast Seed	Seed was rejected due to weed content of seed lot.
tidy tips <i>Layia platyglossa</i>	3	4*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
Douglas' microseris <i>Microseris douglasii</i>	5	6*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
dwarf plantain <i>Plantago erecta</i>	3	3	PG&E Locally Collected Seed, amplified by S&S Seeds	N/A
blue-eyed grass <i>Sisyrinchium bellum</i>	4	4	Jasper Ridge, provided by Pacific Coast Seed and amplified by S&S	N/A
purple needlegrass <i>Stipa pulchra</i>	10	12*	Crystal Springs source, purchased from Hedgerow Farms	Extra seed is available to substitute for species that are not available in sufficient quantity.
<b>Total</b>	<b>42</b>	<b>43.5</b>		

\*Indicates a modification. \*\*Pacific Coast Seed collected seed from a serpentine grassland vegetation communities along a PG&E gas line right-of-way 8.5 miles south of the Crystal Springs project area and along the Bunker Hill gas line right-of-way.

**Table 2. Needlegrass Grassland Seed Mix Proposed for the Non-Disc'd Non-Native Grassland**

SPECIES	VRP APPROVED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	REVISED PROPOSED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE	REASON FOR CHANGE
yarrow <i>Achillea millefolium</i>	0.5	1.5*	PG&E Locally Collected Seed**, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
Chilean trefoil <i>Acmispon wrangelianus</i>	1	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Seed was rejected due to weed content of seed lot.
four-spot <i>Clarkia purpurea</i> var. <i>quadrivulnera</i>	0.5	0.5	Santa Clara County Open Space, purchased from Pacific Coast Seed	N/A
California poppy <i>Eschscholzia californica</i>	1.5	2*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
small fescue <i>Festuca microstachys</i>	10	10.5*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
tidy tips <i>Layia platyglossa</i>	1	3*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
sky lupine <i>Lupinus nanus</i>	1	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Field amplification yields were lower than originally estimated. Sufficient seed is not available.
Douglas' microseris <i>Microseris douglasii</i>	2	2	PG&E Locally Collected Seed, amplified by S&S Seeds	N/A
dwarf plantain <i>Plantago erecta</i>	3	1*	PG&E Locally Collected Seed, amplified by S&S Seeds	Field amplification yields were lower than originally estimated. Sufficient seed is not available.
blue-eyed grass <i>Sisyrinchium bellum</i>	2	4*	Jasper Ridge, provided by Pacific Coast Seed and amplified by S&S	Extra seed is available to substitute for species that are not available in sufficient quantity.
foothill needlegrass <i>Stipa lepida</i>	4	4	Crystal Springs source, purchased from Hedgerow Farms	N/A
purple needlegrass <i>Stipa pulchra</i>	12	12	Crystal Springs source, purchased from Hedgerow Farms	N/A
<b>Total</b>	<b>38.5</b>	<b>40.5</b>		

\*indicates a modification. \*\*Pacific Coast Seed collected seed from a serpentine grassland vegetation communities along a PG&E gas line right-of-way 8.5 miles south of the Crystal Springs project area and along the Bunker Hill gas line right-of-way.

**Table 3. Oak Woodland Seed Mix**

SPECIES	VRP APPROVED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	REVISED PROPOSED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE	REASON FOR CHANGE
yarrow <i>Achillea millefolium</i>	1	2*	PG&E Locally Collected Seed**, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
California brome <i>Bromus carinatus</i>	16	16	Santa Clara County, Arastadero purchased from Pacific Coast Seed	N/A
blue wildrye <i>Elymus glaucus</i> subsp. <i>glaucus</i>	15	15	Crystal Springs source, purchased from Hedgerow Farms	N/A
small fescue <i>Festuca microstachys</i>	5	6*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
sky lupine <i>Lupinus nanus</i>	2	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Field amplification yields were lower than originally estimated. Sufficient seed is not available.
California buttercup <i>Ranunculus californica</i>	1	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Field amplification yields were lower than originally estimated. Sufficient seed is not available.
purple needlegrass <i>Stipa pulchra</i>	0	1*	Crystal Springs source, purchased from Hedgerow Farms	Extra seed is available to substitute for species that are not available in sufficient quantity.
<b>Total</b>	<b>40</b>	<b>40</b>		

\*Indicates a modification. \*\*Pacific Coast Seed collected seed from a serpentine grassland vegetation communities along a PG&E gas line right-of-way 8.5 miles south of the Crystal Springs project area and along the Bunker Hill gas line right-of-way.

The Native Annuals Seed Mix was designed for the disced firebreaks. The seed mix comprises early flowering native annual species that will mature and disperse seed in early spring prior to the disking of firebreaks. The seed from these species will then be in the seed bank at the time of disking and they may germinate in subsequent years.

**Table 4. Native Annuals Seed Mix**

SPECIES	VRP APPROVED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	REVISED PROPOSED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE	REASON FOR CHANGE
Chilean trefoil <i>Acmispon wrangelianus</i>	1	0*	PG&E Locally Collected Seed, amplified by S&S Seeds	Seed was rejected due to weed content of seed lot.
California poppy <i>Eschscholzia californica</i>	1	1	PG&E Locally Collected Seed, amplified by S&S Seeds	N/A
small fescue <i>Festuca microstachys</i>	16	17*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
goldfields <i>Lasthenia gracilis</i>	0.5	0.5	Santa Clara County, Coyote Valley serpentines, purchased from Pacific Coast Seed	N/A
tidy tips <i>Layia platyglossa</i>	1	3*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
sky lupine <i>Lupinus nanus</i>	1.5	0*		Field amplification yields were lower than originally estimated. Sufficient seed is not available.
Douglas' microseris <i>Microseris douglasii</i>	2	4*	PG&E Locally Collected Seed, amplified by S&S Seeds	Extra seed is available to substitute for species that are not available in sufficient quantity.
dwarf plantain <i>Plantago erecta</i>	3	0*		Field amplification yields were lower than originally estimated. Sufficient seed is not available.
California buttercup <i>Ranunculus californica</i>	1	0*		Field amplification yields were lower than originally estimated. Sufficient seed is not available.
<b>Total</b>	<b>27</b>	<b>25.5</b>		

\*indicates a modification. \*\*Pacific Coast Seed collected seed from a serpentine grassland vegetation communities along a PG&E gas line right-of-way 8.5 miles south of the Crystal Springs project area and along the Bunker Hill gas line right-of-way.

**ATTACHMENT B: FINAL PROPOSED SEED MIXES**

**Table 1. Serpentine Grassland Seed Mix**

SPECIES	SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE
yarrow <i>Achillea millefolium</i>	2	PG&E Locally Collected Seed amplified by S&S Seeds
four-spot <i>Clarkia purpurea</i> var. <i>quadrivulnera</i>	0.5	Santa Clara County Open Space, purchased from Pacific Coast Seed
California poppy <i>Eschscholzia californica</i>	2	PG&E Locally Collected Seed, amplified by S&S Seeds
small fescue <i>Festuca microstachys</i>	10	PG&E Locally Collected Seed, amplified by S&S Seeds
tidy tips <i>Layia platyglossa</i>	4	PG&E Locally Collected Seed, amplified by S&S Seeds
Douglas' microseris <i>Microseris douglasii</i>	6	PG&E Locally Collected Seed, amplified by S&S Seeds
dwarf plantain <i>Plantago erecta</i>	3	PG&E Locally Collected Seed, amplified by S&S Seeds
blue-eyed grass <i>Sisyrinchium bellum</i>	4	Jasper Ridge, provided by Pacific Coast Seed and amplified by S&S
purple needlegrass <i>Stipa pulchra</i>	12	Crystal Springs source, purchased from Hedgerow Farms
<b>Total</b>	<b>43.5</b>	

**Table 2. Needlegrass Grassland Seed Mix**

SPECIES	REVISED PROPOSED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE
yarrow <i>Achillea millefolium</i>	1.5	PG&E Locally Collected Seed**, amplified by S&S Seeds
four-spot <i>Clarkia purpurea</i> var. <i>quadrivulnera</i>	0.5	Santa Clara County Open Space, purchased from Pacific Coast Seed
California poppy <i>Eschscholzia californica</i>	2	PG&E Locally Collected Seed, amplified by S&S Seeds
small fescue <i>Festuca microstachys</i>	10.5	PG&E Locally Collected Seed, amplified by S&S Seeds
tidy tips <i>Layia platyglossa</i>	3	PG&E Locally Collected Seed, amplified by S&S Seeds
Douglas' microseris <i>Microseris douglasii</i>	2	PG&E Locally Collected Seed, amplified by S&S Seeds
dwarf plantain <i>Plantago erecta</i>	1	PG&E Locally Collected Seed, amplified by S&S Seeds
blue-eyed grass <i>Sisyrinchium bellum</i>	4	Jasper Ridge, provided by Pacific Coast Seed and amplified by S&S
foothill needlegrass <i>Stipa lepida</i>	4	Crystal Springs source, purchased from Hedgerow Farms
purple needlegrass <i>Stipa pulchra</i>	12	Crystal Springs source, purchased from Hedgerow Farms
<b>Total</b>	<b>40.5</b>	

**Table 3. Oak Woodland Seed Mix**

SPECIES	REVISED PROPOSED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE
yarrow <i>Achillea millefolium</i>	2	PG&E Locally Collected Seed, amplified by S&S Seeds
California brome <i>Bromus carinatus</i>	16	Santa Clara County, Arastadero purchased from Pacific Coast Seed
blue wildrye <i>Elymus glaucus</i> subsp. <i>glaucus</i>	15	Crystal Springs source, purchased from Hedgerow Farms
small fescue <i>Festuca microstachys</i>	6	PG&E Locally Collected Seed, amplified by S&S Seeds
purple needlegrass <i>Stipa pulchra</i>	1	Crystal Springs source, purchased from Hedgerow Farms
<b>Total</b>	<b>40</b>	

**Table 4. Native Annuals Seed Mix**

SPECIES	REVISED PROPOSED SEED MIX SEEDING RATE (PURE LIVE SEED POUND/ACRE)	SEED SOURCE
California poppy <i>Eschscholzia californica</i>	1	PG&E Locally Collected Seed, amplified by S&S Seeds
small fescue <i>Festuca microstachys</i>	17	PG&E Locally Collected Seed, amplified by S&S Seeds
goldfields <i>Lasthenia gracilis</i>	0.5	Santa Clara County, Coyote Valley serpentines, purchased from Pacific Coast Seed
tidy tips <i>Layia platyglossa</i>	3	PG&E Locally Collected Seed, amplified by S&S Seeds
Douglas' microseris <i>Microseris douglasii</i>	4	PG&E Locally Collected Seed, amplified by S&S Seeds
<b>Total</b>	<b>25.5</b>	