



MEMORANDUM

TO: Craig Nistor; Stuart Flett; Larry Buetikofer – Knight Piésold and Co

FROM: Scott Berkebile, PE, QSD/QSP, QISP, ToR – SWPPQueen, Inc.

DATE: May 10, 2022

SUBJECT: Klamath River Renewal Project 100% Design – BMP CGP Compliance Evaluation

1. Purpose

This memorandum provides a summary of temporary and permanent Best Management Practices (BMPs) for erosion and sediment control used for the design of the Klamath River Renewal Project, specifically the dam removal and associated facilities, roads, bridges, and recreation areas. The dams that will be removed include J.C. Boyle Dam in Oregon (OR), Copco No. 1, Copco No. 2, and Iron Gate Dams in California (CA). The JC Boyle Dam is subject to the Oregon Department of Environmental Quality (ODEQ) Stormwater Discharge Permit (Permit No. 1200-C). The Copco No. 1, Copco No. 2, and Iron Gate Dams are subject to the California Construction General Permit (CGP) (Order No. 2009-0009-DWQ as amended by Order No. 2010-2014-DWQ and 2012-0006-DWQ). Temporary and Permanent erosion and sediment control were designed by Knight Piésold for the 100% design plans to comply with the permit associated with each dam's location (state) and are discussed in this memorandum. These BMPs were also selected based on criteria and options outlined in the California Stormwater Quality Association (CASQA) Construction Stormwater BMP Handbook and State of Oregon Department of Environmental Quality (ODEQ) Construction Stormwater Best Management Practices Manual.

2. Temporary and Permanent BMPs – JC Boyle

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the Oregon Permit No. 1200-C and the ODEQ Construction Stormwater BMP Manual.

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Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
<p>Sheet C1600</p> <p>Sheet C1601</p> <p>Sheet C1602</p> <p>Sheet C1603</p>	<p>Sheet C1620</p> <p>Sheet C1621</p> <p>Sheet C1622</p> <p>Sheet C1623</p> <p>Sheet C1624</p>

Site reconnaissance and available geotechnical and soils data found that the site primarily consists of very rocky terrain with sparse vegetation and some fines. This native material does not lend itself to staking of straw wattles, silt fencing, and vegetation re-establishment due to the lack of sufficient fines and adequate rainfall. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable ODEQ BMP manual and OR Permit No. 1200-C references. Some of these BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	ODEQ BMP Manual Reference	OR Permit No. 1200-C
Check Dams	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	2.14	2.1, 2.2
Outlet Protection	Erosion and Sediment Controls: Provide energy dissipation at discharge points to prevent scour	2.18	2.1, 2.2
Diversions	<p>Drainage Controls: Divert run-on and runoff around project work areas to diversion channels and controlled discharge points with outlet protections</p> <p>Erosion and Sediment Controls: Prevent sediment-laden waters from leaving a site and minimizing erosion from the site</p>	2.15	2.1, 2.2
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	2.19	2.1, 2.2

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The project will comply with the Permit No. 1200-C Section 2.2.21 Final Stabilization Criteria and Technical Specification 31 25 00. The table below details the final stabilization methods chosen for each specific area of the project site and the applicable Oregon Permit No. 1200-C requirements for Notice of Termination (NOT) and ODEQ BMP references.

Work Area	ESCP Sheet Number	Slope Range	Proposed Final Stabilization	ODEQ BMP Manual Reference	OR Permit No. 1200-C
Disposal Sites	C1620	3.5H:1V to 5H:1V	Hydroseeding Biodegradable Check Dams Outlet Protection Diversions Rock Slope Protection Native Rocky Soils/Cover (<10% Fines)	2.4, 2.11, 2.14, 2.15	Section 2.2.21.a.i, Section 2.2.21.a.iii
Power Canal Burial and Cover	C1621	2%	Outlet Protection Native Rocky Soils/Cover (<10% Fines)	2.18	Section 2.2.21.a.i, Section 2.2.21.a.iii
Forebay Burial and Cover	C1623	1% to 10%	Outlet Protection Diversions Native Rocky Soils/Cover (<10% Fines)	2.15, 2.18	Section 2.2.21.a.i, Section 2.2.21.a.iii
Scour Hole Fill and Cover	C1623	1% to 1.5H:1V	Diversions Outlet Protection Native Rocky Soils/Cover (<10% Fines)	2.15, 2.18	Section 2.2.21.a.i, Section 2.2.21.a.iii
Penstock Concrete Cover and Powerhouse Cover (includes adjacent staging area)	C1624	1.5H:1V	Biodegradable Check Dams Diversions Native Rocky Soils/Cover (<10% Fines)	2.14, 2.15	Section 2.2.21.a.i, Section 2.2.21.a.iii

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3. Temporary and Permanent BMPs – Copco 1

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the California CGP and the CASQA Construction Stormwater BMP Handbook.

Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
Sheet C2600	Sheet C2620
Sheet C2605	Sheet C2621

Site reconnaissance and available geotechnical and soils data found that the site primarily consists of very rocky terrain with sparse vegetation and some fines. This native material does not lend itself to staking of straw wattles, silt fencing, and vegetation re-establishment due to the lack of sufficient fines and adequate rainfall. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable CASQA Construction Stormwater BMP Handbook and CA CGP references. Some of these BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	CASQA BMP Handbook Reference	CA CGP
Check Dams	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-4	Attachment E – Section E
Velocity Dissipation Devices	Erosion and Sediment Controls: Provide energy dissipation at discharge points to prevent scour	EC-10	Attachment E – Section D
Earth Dikes and Drainage Swales	Drainage Controls: Divert run-on and runoff around project work areas to diversion channels and controlled discharge points with outlet protections	EC-9	Attachment E – Section D

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	Erosion and Sediment Controls: Prevent sediment-laden waters from leaving a site and minimizing erosion from the site		
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	TC-1	Attachment E – Section E

The project will utilize the aspect of the CGP Section II.D.3.c that allows for a “Custom Method” with permanent stabilization measures designed to provide long-term protection to underlying soils. The table below details the final stabilization methods chosen for each specific area of the project site and the applicable CGP requirements for Notice of Termination (NOT) and CASQA BMP Handbook references.

Work Area	ESCP Sheet Number	Slope Range	Proposed Final Stabilization	CASQA BMP Handbook Reference	CA CGP
Disposal Sites	C2620	3H:1V	Biodegradable Check Dams Velocity Dissipation Devices Earth Dikes and Drainage Swales Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	SE-4, EC-9, EC-10, EC-16	Section II.D.3.c
Powerhouse Cover	C2621	1.5H:1V	Biodegradable Check Dams Earth Dikes and Drainage Swales Rock Slope Protection Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	SE-4, EC-9, EC-16	Section II.D.3.c
Powerhouse Access Roads	C2620	1.5H:1V	Biodegradable Check Dams Velocity Dissipation Devices Earth Dikes and Drainage Swales	SE-4, EC-9, EC-10	Section II.D.3.c

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Staging Areas	C2620	3H:1V	Biodegradable Check Dams Earth Dikes and Drainage Swales Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	SE-4, EC-9, EC-16	Section II.D.3.c
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4. Temporary and Permanent BMPs – Copco 2

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the California CGP and the CASQA Construction Stormwater BMP Handbook.

Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
Sheet C3600	Sheet C3620
Sheet C3601	Sheet C3622
Sheet C3605	Sheet C3623
Sheet C3606	Sheet C3624

Site reconnaissance and available geotechnical and soils data found that the site primarily consists of very rocky terrain with sparse vegetation and some fines. This native material does not lend itself to staking of straw wattles, silt fencing, and vegetation re-establishment due to the lack of sufficient fines and adequate rainfall. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable CASQA Construction Stormwater BMP Handbook and CA CGP references. Some of these BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	CASQA BMP Handbook Reference	CA CGP
Check Dams	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-4	Attachment E – Section E

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Velocity Dissipation Devices	Erosion and Sediment Controls: Provide energy dissipation at discharge points to prevent scour	EC-10	Attachment E – Section D
Earth Dikes and Drainage Swales	Drainage Controls: Divert run-on and runoff around project work areas to diversion channels and controlled discharge points with outlet protections Erosion and Sediment Controls: Prevent sediment-laden waters from leaving a site and minimizing erosion from the site	EC-9	Attachment E – Section D
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	TC-1	Attachment E – Section E

The project will utilize the aspect of the CGP Section II.D.3.c that allows for a “Custom Method” with permanent stabilization measures designed to provide long-term protection to underlying soils. The table below details the final stabilization methods chosen for each specific area of the project site and the applicable CGP requirements for Notice of Termination (NOT) and CASQA BMP Handbook references.

Work Area	ESCP Sheet Number	Slope Range	Proposed Final Stabilization	CASQA BMP Handbook Reference	CA CGP
Dam Excavation	C3620	1.5H:1V	Rock Slope Protection Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-16	Section II.D.3.c
Wood-Stave Penstock Backfill	C3622	0.5%	Earth Dikes and Drainage Swales Velocity Dissipation Devices Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-9, EC-10, EC-16	Section II.D.3.c

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Penstock and Powerhouse Cover	C3623	2.5H:1V	Biodegradable Check Dams Earth Dikes and Drainage Swales Velocity Dissipation Devices Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	SE-4, EC-9, EC-10, EC-16	Section II.D.3.c
Tailrace Fill	C3623	2.5H:1V	Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-16	Section II.D.3.c
Dam Access Roads	C3620	1.5H:1V	Biodegradable Check Dams Earth Dikes and Drainage Swales	SE-4, EC-9	Section II.D.3.c
Copco Village	C3624	1.5H:1V	Biodegradable Check Dams Earth Dikes and Drainage Swales	SE-4, EC-9	Section II.D.3.c

5. Temporary and Permanent BMPs – Iron Gate

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the California CGP and the CASQA Construction Stormwater BMP Handbook.

Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
<p>Sheet C4600</p> <p>Sheet C4601</p> <p>Sheet C4605</p>	<p>Sheet C4610</p> <p>Sheet C4615</p>

Site reconnaissance and available geotechnical and soils data found that the site primarily consists of very rocky terrain with sparse vegetation and some fines. This native material does not lend itself to staking of straw wattles, silt fencing, and vegetation re-establishment due to the lack of sufficient fines and adequate rainfall. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable CASQA Construction Stormwater BMP Handbook and CA CGP references. Some of these

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BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	CASQA BMP Handbook Reference	CA CGP
Check Dams	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-4	Attachment E – Section E
Velocity Dissipation Devices	Erosion and Sediment Controls: Provide energy dissipation at discharge points to prevent scour	EC-10	Attachment E – Section D
Earth Dikes and Drainage Swales	Drainage Controls: Divert run-on and runoff around project work areas to diversion channels and controlled discharge points with outlet protections Erosion and Sediment Controls: Prevent sediment-laden waters from leaving a site and minimizing erosion from the site	EC-9	Attachment E – Section D
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	TC-1	Attachment E – Section E

The project will utilize the aspect of the CGP Section II.D.3.c that allows for a “Custom Method” with permanent stabilization measures designed to provide long-term protection to underlying soils. The table below details the final stabilization methods chosen for each specific area of the project site and the applicable CGP requirements for Notice of Termination (NOT) and CASQA BMP Handbook references.

Work Area	ESCP Sheet Number	Slope Range	Proposed Final Stabilization	CASQA BMP Handbook Reference	CA CGP
Powerhouse Fill	C4610	2.5H:1V to 5H:1V	Rock Slope Protection	EC-16	Section II.D.3.c

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			Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization		
Spillway Fill	C4610	4H:1V	Rock Slope Protection Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-16	Section II.D.3.c
Disposal Site #1	C4610	2H:1V to 1%	Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-16	Section II.D.3.c
Disposal Site #2	C4610	2H:1V to 1%	Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-16	Section II.D.3.c
Disposal Site #3	C4615	2H:1V to 1%	Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	EC-16	Section II.D.3.c
Staging Areas	C4610	2H:1V to 1%	Biodegradable Check Dams Earth Dikes and Drainage Swales Native Rocky Soils/Cover (<10% Fines) – Non-Vegetative Stabilization	SE-4, EC-9, EC-16	Section II.D.3.c

6. Temporary and Permanent BMPs – Access Roads and Bridges

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the California CGP and the CASQA Construction Stormwater BMP Handbook.

Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
Sheet C5203 Sheet C5303	Sheet C5204 Sheet C5304

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Site reconnaissance and available geotechnical and soils data found that the site primarily consists of very rocky terrain with sparse vegetation and some fines. However, much of the new roadway will use engineered fill material that has 30-40% fines and can be erodible. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable CASQA Construction Stormwater BMP Handbook and CA CGP references. Some of these BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	CASQA BMP Handbook Reference	CA CGP
Check Dams	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-4	Attachment E – Section E
Fiber Rolls	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-5	Attachment E – Section E
Erosion Control Blankets	Erosion Controls: Provide temporary cover to reduce erosion potential	EC-7	Attachment E – Section D
Velocity Dissipation Devices	Erosion and Sediment Controls: Provide energy dissipation at discharge points to prevent scour	EC-10	Attachment E – Section D
Earth Dikes and Drainage Swales	Drainage Controls: Divert run-on and runoff around project work areas to diversion channels and controlled discharge points with outlet protections Erosion and Sediment Controls: Prevent sediment-laden waters from leaving a site and minimizing erosion from the site	EC-9	Attachment E – Section D
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	TC-1	Attachment E – Section E

The new roadways and bridges outlined below will utilize the aspect of the CGP Section II.D.3.a to establish vegetation growth on the new slopes to 70% coverage. The table below details the final

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stabilization methods chosen for each specific area of the project site and the applicable CGP requirements for Notice of Termination (NOT) and CASQA BMP Handbook references.

Work Area	ESCP Sheet Number	Slope Range	Proposed Final Stabilization	CASQA BMP Handbook Reference	CA CGP
Camp Creek Road/Culvert	C5204	N/A	Rock Check Dams Earth Dikes and Drainage Swales Biodegradable Fiber Rolls Velocity Dissipation Devices Hydroseeding with Tackifier	SE-4, SE-5, EC-4, EC-9, EC-10	Section II.D.3.a
Scotch Creek Road/Culvert	C5304	N/A	Rock Check Dams Earth Dikes and Drainage Swales Biodegradable Fiber Rolls Velocity Dissipation Devices Hydroseeding with Tackifier	SE-4, SE-5, EC-4, EC-9, EC-10	Section II.D.3.a

7. Temporary and Permanent BMPs – Oregon Recreation Areas

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the Oregon Permit No. 1200-C and the ODEQ Construction Stormwater BMP Manual.

Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
Sheet C7000	Sheet C7000
Sheet C7005	Sheet C7005
Sheet C7010	Sheet C7010
Sheet C7015	Sheet C7015

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Site reconnaissance and available geotechnical and soils data found that the site primarily consists of sparse vegetation, gravel parking areas, and some fines. Recreation areas will be demolished including most of the existing concrete and gravel parking areas will be removed. Buildings and other structures will be removed. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable ODEQ BMP manual and OR Permit No. 1200-C references. Some of these BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	ODEQ BMP Manual Reference	OR Permit No. 1200-C
Sediment (Silt) Fence	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	2.24	2.1, 2.2
Erosion Control Blankets	Erosion Controls: Provide temporary cover to reduce erosion potential	2.6	2.1, 2.2
Diversions	Drainage Controls: Divert run-on and runoff around project work areas to diversion channels and controlled discharge points with outlet protections Erosion and Sediment Controls: Prevent sediment-laden waters from leaving a site and minimizing erosion from the site	2.15	2.1, 2.2
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	2.19	2.1, 2.2

The project will comply with the Permit No. 1200-C Section 2.2.21 Final Stabilization Criteria and Technical Specification 31 25 00. The table below details the final stabilization methods chosen for each specific area of the project site and the applicable Oregon Permit No. 1200-C requirements for Notice of Termination (NOT) and ODEQ BMP references.

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Work Area	ESCP Sheet Number	Slope Range	Proposed Final Stabilization	ODEQ BMP Manual Reference	OR Permit No. 1200-C
Gravel Parking Lots	C7005	<2%	Hydroseeding Native Rocky Soils/Cover (<10% Fines)	2.3, 2.4	Section 2.2.21.a.i, Section 2.2.21.a.iii
	C7010				
	C7015				
Poles & Signs	C7005	<2%	Hydroseeding Native Rocky Soils/Cover (<10% Fines)	2.3, 2.4	Section 2.2.21.a.i, Section 2.2.21.a.iii
	C7010				
	C7015				

8. Temporary and Permanent BMPs – California Recreation Areas

The following 100% design plan sheets were used to evaluate temporary and permanent erosion and sediment control BMPs proposed for the project. BMP types were selected based on the California CGP and the CASQA Construction Stormwater BMP Handbook.

Temporary Erosion and Sediment Control BMPs	Permanent Erosion and Sediment Control BMPs
Sheet C7020	Sheet C7020
Sheet C7025	Sheet C7025
Sheet C7030	Sheet C7030
Sheet C7035	Sheet C7035
Sheet C7040	Sheet C7040
Sheet C7045	Sheet C7045
Sheet C7050	Sheet C7050
Sheet C7055	Sheet C7055
Sheet C7060	Sheet C7060
Sheet C7065	Sheet C7065
Sheet C7070	Sheet C7070
Sheet C7075	Sheet C7075

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Site reconnaissance and available geotechnical and soils data found that the site primarily consists of sparse vegetation, gravel parking areas, and some fines. Recreation areas will be demolished including most of the existing concrete and gravel parking areas will be removed. Buildings and other structures will be removed. The table below outlines the proposed temporary structural BMPs selected for the project and the applicable CASQA Construction Stormwater BMP Handbook and CA CGP references. Some of these BMPs will also be used as permanent BMPs given their flexibility and usefulness to fulfill both requirements.

BMP	BMP Purpose	CASQA BMP Handbook Reference	CA CGP
Silt Fence	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-1	Attachment E – Section E
Fiber Rolls	Erosion and Sediment Controls: Reduce channel erosion by restricting flow velocity and minimizing sediment discharges from the site	SE-5	Attachment E – Section E
Hydroseeding	Erosion Controls: Provide temporary or permanent cover to reduce erosion potential	EC-4	Attachment E – Section D
Stabilized Construction Entrance/Exit	Erosion and Sediment Controls: Prevent offsite tracking of sediments by construction vehicles and equipment onto public or private roads	TC-1	Attachment E – Section E

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