Card Street Fire
Suppression Repair Plan

Prepared by: _____

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The following guidelines were developed to help fire managers repair areas damaged or disturbed during fire suppression operations on the Card Street Fire (AK-KIDC-503292). These guidelines are for Wildfire Suppression Activity Damage Repair on areas damaged during the incident and to be financed (charged to the fire incident). Suppression damage repairs are usually completed by fire suppression crews and equipment as directed by the Incident Management Team (IMT) following containment of the wildfire. These guidelines are not for a BAER (Burned Area Emergency Rehabilitation) Plan.

Suppression repair is the responsibility of the IMT assigned to the fire. Repairs to external control lines should start as soon as the damaged areas are "released" by the Operations Section Chief. Repairs to control lines that are no longer external to the fire perimeter, safety zones that are no longer needed, and spike camps that are no longer in use, should be repaired as soon as appropriate equipment and personnel are available to accomplish the repair. The Planning Section staff should provide an inventory of ground disturbance from fire suppression activities including: dozer lines, brush lines, hand lines, constructed safety zones, helispots, water source sites, etc.

The Card Street Fire burned area currently includes Kenai National Wildlife Refuge, State of Alaska, Kenai Peninsula Borough, Native, and Private lands. The reported area and land ownership values are representative of the fire perimeter as of June 26, 2015. Additional areas are known to have burned, but a more accurate perimeter was not available at the time of this report. The goal of suppression repair is to prevent the long term environmental degradation of the land and its natural resources, and to encourage recovery.

Land Ownership	Acres
Kenai Peninsula Borough	165
Native	974
Private	162
State of Alaska	438
Kenai National Wildlife Refuge	7065
TOTAL	**8804**

Table 1: Card Street Fire Ownership

Land Ownership	Feet	Miles
Private	6153	1.16
State	1378	0.26
Native	543	0.10
Federal	27426	5.19

Table 2: Card Street Fire Dozer Line by Ownership Type

Note: **Total Dozer Line = 35500 ft (6.72 mi)**

Repair Objectives:

1) Reduce or eliminate erosion and sedimentation that could result from fire suppression activities such as constructed fire lines and safety zones, and localized disturbed areas such as spike camps, staging areas, drop points, and helispots.

2) Protect sensitive wetland or riparian areas from further disturbance and cover with woody debris, vegetation or other suitable organic material to hold soils in place and encourage the regeneration of natural vegetation.

3) Prevent future accessibility of fire lines from unauthorized/unwanted ORV use.

4) Remove all equipment, supplies, flagging and trash from fire lines, spike camps, helispots, and water source sites.

5) Cover significant portions of exposed soil to reduce opportunities for invasive plant establishment.

General Fireline Repair:

All trash should be removed from fireline, drop points, and helispots and back-hauled to the ICP for proper disposal. Check all firelines and travel routes for litter.

Where heavy equipment will be used for repairs or where all-terrain vehicles are used for access, repairs should begin at the furthest point on the line from the access point and proceed out.

Where mineral soil has been exposed, provide adequate drainage by constructing water bars. Recommended waterbar spacing is indicated below depending on the fire line slope. On relatively flat areas, waterbars should alternate directional flow (in a herring bone configuration).

Spread the extra soil to the downhill side of the water bar to help hold it in place. Extend the uphill portion of the water bar well beyond the edge of the fire line so that runoff does not sneak around the top of the water bar. Do not place water bars perpendicular to the fireline. Excavate the soil at the bottom end of the bar to allow water to drain away from the fireline.

Where trees have been felled, flush-cut stumps where practicable, or cut stumps to within 12 inches of the ground on the high side. Cut any hazardous sharp stumps or staubs parallel to the ground.

Where indicated, block access to fireline by constructing berms.

Dozer Lines

General dozer line rehab includes leveling berm piles and spreading material within the blade line to both mitigate erosion potential and expedite revegetation. Water bar construction is also common in sloped areas where runoff can lead to significant problems.

Slope	Spacing
0-5%	400 ft
6-10%	300 ft
11-20%	200 ft
21-40%	100 ft
41-50%	50 ft
>50%	25 ft

Table 3: Dozerline Waterbar Spacing

- Actual location of waterbars should take advantage of natural slope breaks, and to minimize drainage on downslope burned areas.
- Use natural rolls and dips wherever possible.
- Waterbars should be skewed approximately 30-45 degrees from horizontal and away from the fire if possible. Waterbars should be opened on the downhill side to allow water to flow freely off the dozerline.
- Reinforce waterbars on cup trenches that run near parallel to the slope. Material used for reinforcing will be anchored into both edges of the fireline.

- On wet and dry sections of the dozer line, to prevent soil movement and to help prevent unauthorized or unwanted off-road vehicle access, use an excavator with thumb to pull trees, logs, brush and other organic material into the fire line (where adequate debris exists) to achieve at least 65% ground cover. Use bucket teeth to rough up any compacted soils.

Safety Zones

Re-spread all berms as evenly as possible to promote reestablishment of native vegetaion and minimize erosion.

Cold-trailed Edge with Walking Trail

Unless mineral soil has been exposed along the fireline, repair consists of removal of all equipment, supplies, flagging and trash from the fireline.

In specific locations where handline has been constructed to mineral soil, waterbar spacing should be approximately:

Fire Line Slope	Water Bar Spacing
0-10%	Every 200 feet
10-30%	Every 100-150 ft.
30-40%	Every 75-100 ft.
40-60%	Every 50 ft.
>60%	Every 25 ft.

Table 4: Hand line Waterbar Spacing (if mineral soil is exposed)

- Actual location of water bars should take advantage of natural slope breaks, and to minimize drainage on down slope burned areas.
- Use natural rolls and dips wherever possible.
- Water bars should be skewed horizontally approximately 30-45 degrees from horizontal and drained away from the fire if possible. Water should drain onto stable or vegetated sites.
- Scatter branches, wood, rock or other material to naturalize the fire line and further retard soil movement at locations identified by the Resource Advisor. Scattered material should be randomly placed at least every 5 ft. along the hand line. Strive to achieve at least a 65% ground cover on areas treated with scattered material to prevent soil movement. In grassy areas or where no material is available, replace soil, water bar, and scatter a few rocks on the line to naturalize.
- Reinforce waterbars on cup trenches that run near parallel to the slope. Material used for reinforcing will be anchored into both edges of the fireline.

Spike Camps

- Remove all equipment, supplies, and trash from camps and back-haul to ICP.
- Where trees have been felled, flush-cut stumps where practicable, or cut stumps to within 12 inches of the ground on the high side. Cut any hazardous sharp stumps or staubs parallel to the ground.

Helispots, Staging Area, and Drop Points

- Pull all flagging, trash, signs, oil etc.
- Repair of helispots will be done on a case by case basis as directed by the Resource Advisor.

Fueling Sites

- Spilled fuels or other toxic substances should be removed. Contaminated soils may need to be removed. Remove hazardous material containment pads and dispose of - properly.

Water Sources (Drafting or Pump Sites)

- Remove sumps, dams or dikes constructed during fire suppression, and return sites as closely as possible to surrounding terrain condition. Make sure all hose is collected and removed.

Appendix A: Repair Needs by Division

DIV-A

- None of Division A falls within the boundaries of the Kenai National Wildlife Refuge and thus this repair plan does not address any issues in this division.

DIV-D

Dozer line from Card St./Lepus Avenue to Bottenintnin Lake

- A dozer line was constructed from the corner of Lepus Ave to an un-named lake .75 miles south of the origin. A second dozer line was constructed from the first dozer line east to the southerly most residence on adjacent Zenith Street and then continuing east to the northwest corner of Bottenintnin Lake. The eastern .7 miles of this line fall on the Kenai National Wildlife Refuge (Map 1).

- The soils were dominated (75%) by peat and to a lesser degree (25%) silty loam intermixed with gravel and stream rocks.

- The organic layer was pushed to the north side of the line which was mostly the top layer of peat with an occasional black spruce and various shrubs. In many cases the organic layer is rolled and intact and may be used as effective cover for repair use.

- There is virtually 0 slope along the portion of the dozer line to Bottenintnin Lake on the Kenai National Wildlife Refuge so the use of water bars in this region would be ineffective and is not advised.

- Primary objectives for repair of this area are to cover exposed soil to reduce threat from invasive plants and reduce erosion. Secondarily with permission from landowner, access to the dozer line in a forested area should be blocked to protect repair work and reduce illegal atv incursions to the Refuge.

Dozer line from Skilak Loop Rd to SE corner of Bottenintnin Lake

- This dozer line ranges from 16m to 25m depending on slope and fuel type in the area.
- Starting from Skilak Loop Rd., the line drops down a slope that is mostly soil to a very wet mix of soil, black spruce, and sphagnum moss. It then climbs back up to the top of a hill (7 m high) before dropping back down to the lake and a float mat of vegetation covering approximately 5 meters to the water's edge.
- A large berm of overburden is situated on the west side of the line and much of the east side is burned out with standing dead black spruce.
- A 1 meter high berm that existed near the transition to the lake (likely the result of ice shoved ramparts or wave action) was removed and needs to be re-built.

DIV-K

Skilak Loop to Marsh Lake

- A minimum of 3.3 miles of dozer line were constructed from Skilak Loop Rd. to Marsh Lake.
- There are several places where there is a main contingency line and the direct attack line as the fire reached the north side of the pre-existing clearing.
- The habitat is a mix of more mature hardwood and spruce and a larger portion of younger mixed hardwood, alder, and spruce resulting from crushing and burning in the 1970's.
- The width of the disturbed zone form the dozer line generally ranges from 5 to 7m wide as it was only cleared one dozer width wide. There are keyholes every few hundred meters where over burden was pushed up a little wider to clear the dozer blade and give an access break for ground crews.
- The terrain is relatively flat until the dozer line heads north away from the pre-existing clearing. From this point on the line is a series of twisting moguls, sharp corners, and moderate sloped hills with elevation gains and falls of 5 to 15m.
- Slash in ditches has been placed on both sides of Skilak Loop Rd.
- A saw line was constructed from Skilak Loop Rd. to the south end of Marsh Lake.

DIV-M

- Slash in ditches has been placed on both sides of Skilak Loop Rd.

DIV-P

- No repair needs were identified in this section.

DIV-R

- No repair needs were identified in this section.

Appendix B: Repair Prescription by Division

DIV-A

No line repair prescribed by the Fish and Wildlife Service as this section of the fire is off of the Kenai National Wildlife Refuge.

DIV-D

Dozer line from Card Rd./Lepus Avenue to Bottenintnin Lake.

- Recommend use of a low impact wide track mini-excavator with a thumb if available.
- Pull overburden material from berm on North side of line and spread over exposed soils.
- When possible, spread intact chunks of sphagnum moss across the line to achieve 65% coverage of exposed soil. A small hand crew may be beneficial to assist with placing moss mats vegetation side up.
- The area is flat and no water bars should be needed in this area to control soil erosion.

Dozer line from Skilak Loop Rd. to SE corner of Bottenitnin Lake

- Recommend use of low impact wide track equipment.
- Pull overburden material from berm on the west side of line and spread over exposed soils with a priority of covering dry soil areas with moss and down trees. The two slopes (near Skilak Loop Rd. and near Bottenintnin Lake).
- Rebuild and match the existing berm ringing the lake. The re-built berm should be connected to berm on either side of dozer line and should be constructed using down trees, soil, and moss from the overburden pile on the west side of the line. This work may be completed with an excavator, but if available a hand crew may be more effective and less damaging, working in close proximity to the lake edge.
- If any small black spruce from the overburden appear to be alive and have substantial root wad attached, efforts to replace a few of these in the line in the first 50 m north of the lake and on the slope leaving Skilak Loop Rd. will significantly increase the success of the repair in both erosion control and creating a visual barrier of the rest of the repair work. Tree planting will be necessary north of the lake up to the top of the first slope and from Skilak Lake Rd. south to the westward bend in the dozer line for long-term repair of this dozer line.
- Water bars will be necessary on the slopes at spacing as described on page 3 of this plan.

DIV-K

Skilak Loop Rd. to Marsh Lake

- There are three treatment types that should be implemented in this complex of dozer lines.

1. Drag the sphagnum moss and trees back over the line to try and achieve at least 65 percent soil coverage to help control erosion and invasive plant colonization. Use a low impact wide track excavator with a thumb to roll back and place intact chunks of sphagnum across the line. If necessary in wet/boggy areas a small hand crew should assist with attaining coverage and making sure the sphagnum mats landed vegetation side up. This will significantly improve the results of live vegetation taking hold and controlling erosion. Construct water bars on slopes as described on page 5 of this plan.
2. Cut out large timber (10 inch diameter) and pull remaining overburden into the center of the dozer line using a low impact wide track excavator with a thumb. Then bring in a low impact wide track masticator and grind everything to a mix of soil and wood bits. Level the resulting mix across the dozer line. Place water bars at specified distances as described on page 3 of this plan. There are several places where a side hill exists along the dozer line. These areas should be slightly leveled prior to pulling overburden back into the line to assist with reduction of soil movement within and from the line and lessen the need for water bars in these areas.
3. No treatment. Leave dozer lines as they are to re-vegetate naturally .

- Map 2 delineates which section should receive each treatment type.
- There is a considerable amount of slash that has been placed in the ditches on both sides of Skilak Loop Rd. and Lower Skilak Landing Rd. This slash should be moved to Engineer Lake Gravel Pit and run through a chipper with the resulting chips left at the gravel pit for future restoration needs.

DIV-M

- No dozer lines were constructed, but there is a significant amount of slash that has been placed in the ditches on both sides of Skilak Loop Rd. This slash should be moved to Engineer Lake Gravel Pit and run through a chipper with the resulting chips left at the gravel pit for future restoration needs.

DIV-P

- No prescribed repairs to be completed.

DIV-R

- No prescribed repairs to be completed.

Appendix C: Repair Maps

Attached files include:

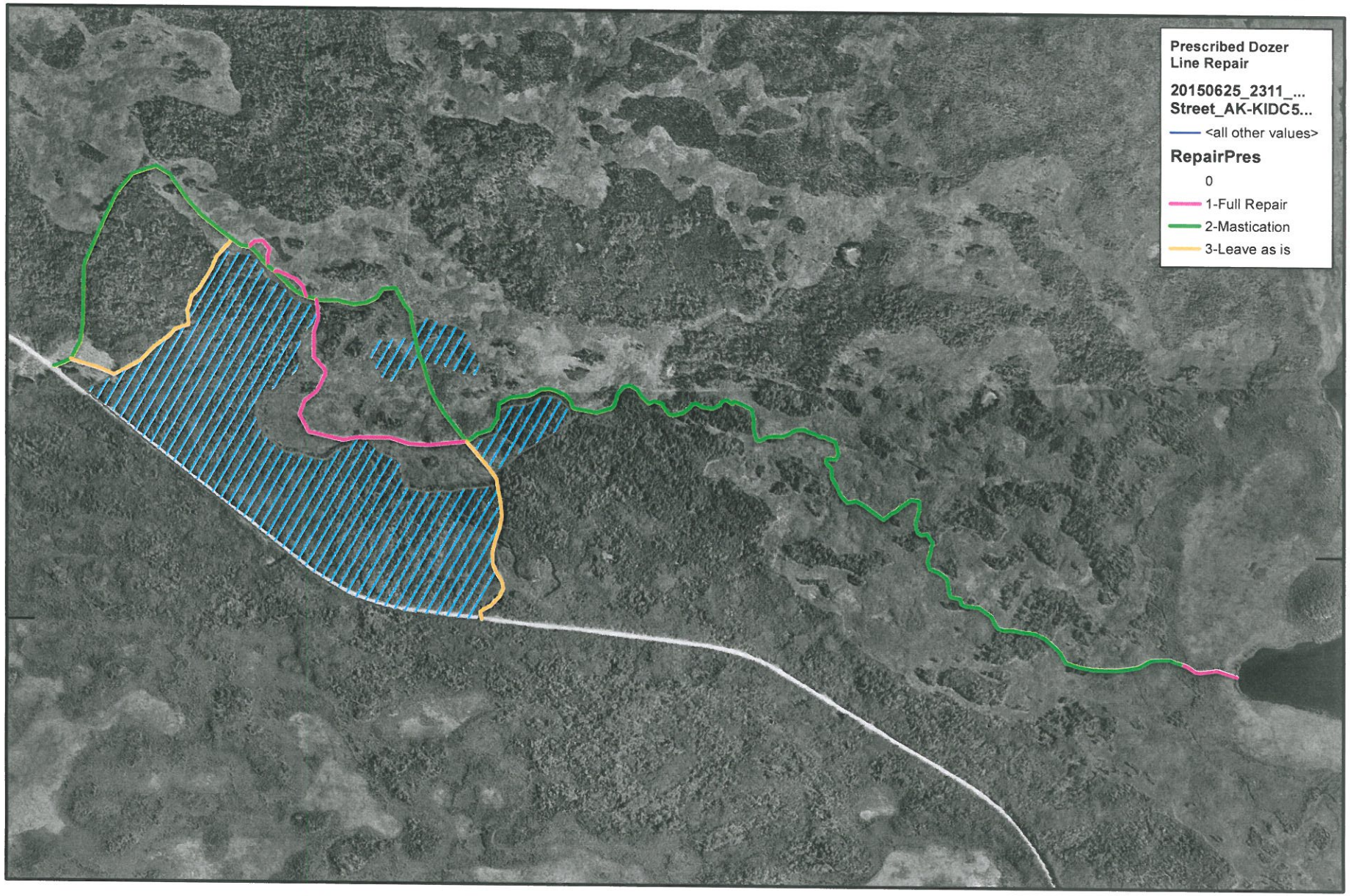
Map 1. West Bottenintnin Lake Dozer Line.pdf

Map 2. Marsh Lake Dozer Complex.pdf

U.S. Fish & Wildlife Service

Kenai National Wildlife Refuge
Soldotna, Alaska

Map of Card Street Fire Suppression Plan of Marsh Lake Dozer Complex



Produced in GIS Department (Todd Eskelin)
Kenai NWR
Soldotna, Alaska

0 0.15 0.3 0.6 Kilometers

0 0.125 0.25 0.5 Miles

UTM ZONE 5N
NAD 83

N
W E
S

U.S. Fish & Wildlife Service

Kenai National Wildlife Refuge
Soldotna, Alaska

Map of Card Street Fire Suppression Repair Plan of Card Street to Bottenintnin Lake Dozer Line

Produced in GIS Department (Todd Eskelin)
Kenai NWR
Soldotna, Alaska

0 0.2 0.4 0.8 Kilometers
0 0.175 0.35 0.7 Miles

UTM ZONE 5N
NAD 83

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