Two Rivers Watershed District
Klondike Clean Water Retention Project #11
Fact Sheet – 10/1/22

Exterior Drainage for Lat 1 SD 95
"New SD 95 Lat 1"

To maintain exterior drainage during operation of the KCWRP #11, a new channel must be constructed to the south of the Diked Inlet. This new channel connects to the existing SD 95 Lat 1 at a point one mile east of the Roseau-Kittson county line and runs parallel to the Diked Inlet / Existing SD 95 Lat 1 until 160th Ave. This new channel is designed to convey local drainage and portions of the SD 95 Lat 1 drainage that exceeds either the Diked Inlet's flow capacity or the Impoundment's storage capacity. This criterion also creates the need for a gated structure at the upstream end of the channel. The existing ditch bottom elevation in SD 95 Lat 1 at 160th Ave is 1014.0' which equals the maximum impoundment pool elevation in Phase 1. Natural ground near 160th Ave and SD 95 Lat 1 is approximately 1020.0'. Phase 2 has a maximum impoundment pool elevation of 1015.5'. Therefore, the invert elevation for the gated structure into the new parallel SD 95 Lat 1 will be 1015.5' at the upstream end to allow for the phase 2 full pool to be contained and allow excess inflows to be bypassed above 1015.5'.

Existing Conditions

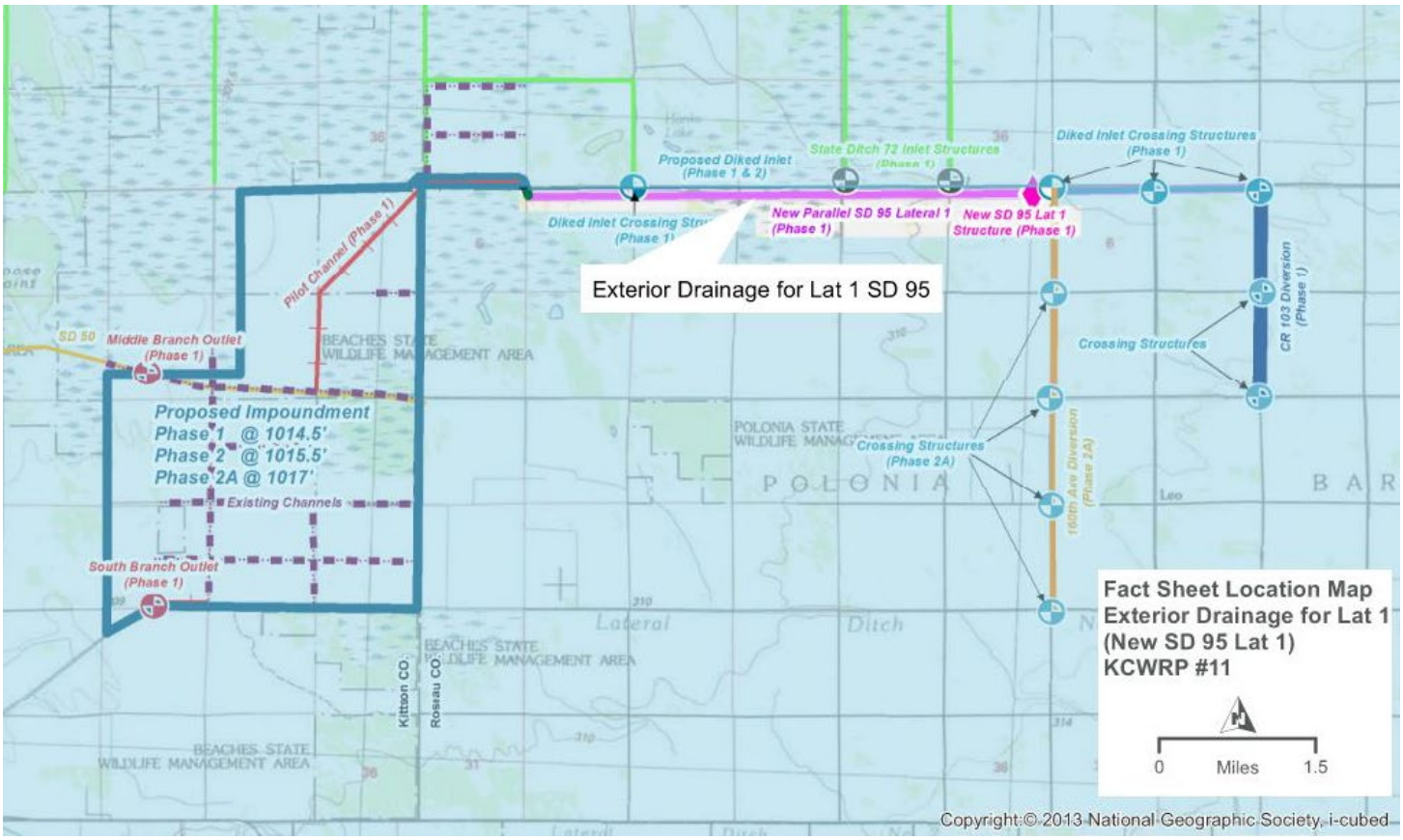
This will be new excavation. Natural ground at the westernmost (downstream) point of the new channel is at elevation 1013, and the existing SD 95 Lat 1 at this point is 1008'. However, just under a half-mile to the east, there is a ridge that begins and reaches an elevation of 1017.6 near 120th Ave. The drainage area west of 120th Ave is 1.7 square miles. The eastside of the ridge then falls back down to below elevation 1016 at a point approximately two miles east of the downstream end. This point has a 2-square-mile drainage area that will be entirely conveyed by the new channel. There is only one road that will be intersected with this new channel (120th Ave), but there are existing dikes and existing spoil berm that currently serve as an access for ATVs or foot traffic. Some land is used for pasture and is enclosed by a fence. Several culverts exist that convey runoff into SD 95 Lat 1 from the south. These drainage areas will be summarized below and will provide the design flows for this new channel.

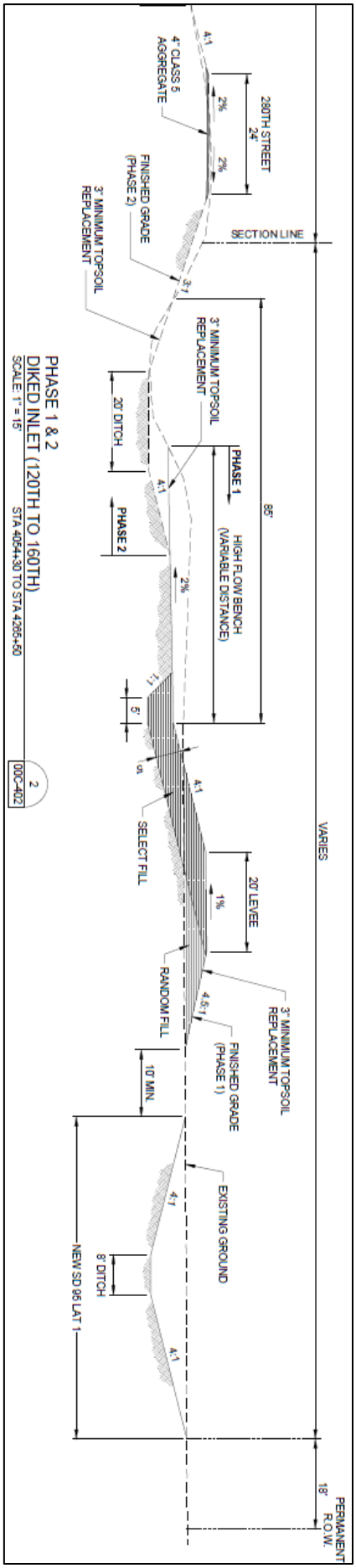
Location	10-Year Peak Flow (cfs)	Sum of upstream peak flows (cfs) (w/bypass +65 cfs)	New Lateral 1 Station (Upstream)
SD 95 Lat 1 near County Line/Impoundment	41.0	144.8 (210)	510+80
3 miles east of county line (130th Ave)	48.8	103.8 (169)	564+00
Between 160th Ave and Huseby ditch outlet	32.9	55 (120)	669+00
Ditch on east side of 160th Ave	22.1		
Upstream drainage area for SD 95 Lat 1	573.9 (controlled by Diked Inlet)		

New SD 95 Lat 1 Design

Summing the peak flows would give a conservative estimate of a 10-year event peak flow, equaling 144.8 cfs, assuming the Diked Inlet is available to convey all upstream flows. In the KCWRP outlet sizing models, which assume a full impoundment and subsequent probable maximum precipitation event, the Diked Inlet bypasses some flows through the inlet structure and into this new channel. That peak flow is approximately 65 cfs. The design of this new channel will include this extra capacity, which is above the standard 10-year capacity for agricultural drainage. Obviously, during a probable maximum precipitation event, there will be excess runoff that uses this channel; however, the local areas will still have better drainage than existing conditions would allow. Ditch inverts were chosen to accommodate the existing side inlet pipes.

Sta Start	Sta End	Bottom Width (ft)	Grade (%)	Min depth (ft)	Start Elev	End Elev	Design Capacity (cfs)
400+00	458+00	8	.02	5.5	1008.4	1009.5	210
458+00	510+80	8	.02	5.5	1009.5	1010.5	210
510+80	564+00	8	.02	5	1010.5	1011.5	169
564+00	617+50	8	.03	4	1011.5	1013.25	124
617+50	669+00	8	.03	4	1013.25	1015.0	124




PHASE 1 & 2
DIKED INLET (120TH TO 160TH)
SCALE: 1" = 15'
STA 4054+30 TO STA 4265+60
2
D0C-402
4" CLASS 5 AGGREGATE
4:1
2%
2%
280TH STREET
24'
FINISHED GRADE (PHASE 2)
3" MINIMUM TOPSOIL REPLACEMENT
SECTION LINE
3:1
3" MINIMUM TOPSOIL REPLACEMENT
20' DITCH
PHASE 1
PHASE 2
4:1
HIGH FLOW BENCH (VARIABLE DISTANCE)
85'
2%
1:1
5'
1%
4:1
SELECT FILL
VARIES
20' LEVEE
1%
RANDOM FILL
4.5:1
3" MINIMUM TOPSOIL REPLACEMENT
FINISHED GRADE (PHASE 1)
10' MIN.
EXISTING GROUND
4:1
NEW SD 95 LAT 1
8' DITCH
4:1
18'
PERMANENT R.O.W.

Lat1 SD95 at Roseau County Road 103 – looking west
The ‘New’ 95 will be located on the south (left in this photo) side of the existing ditch