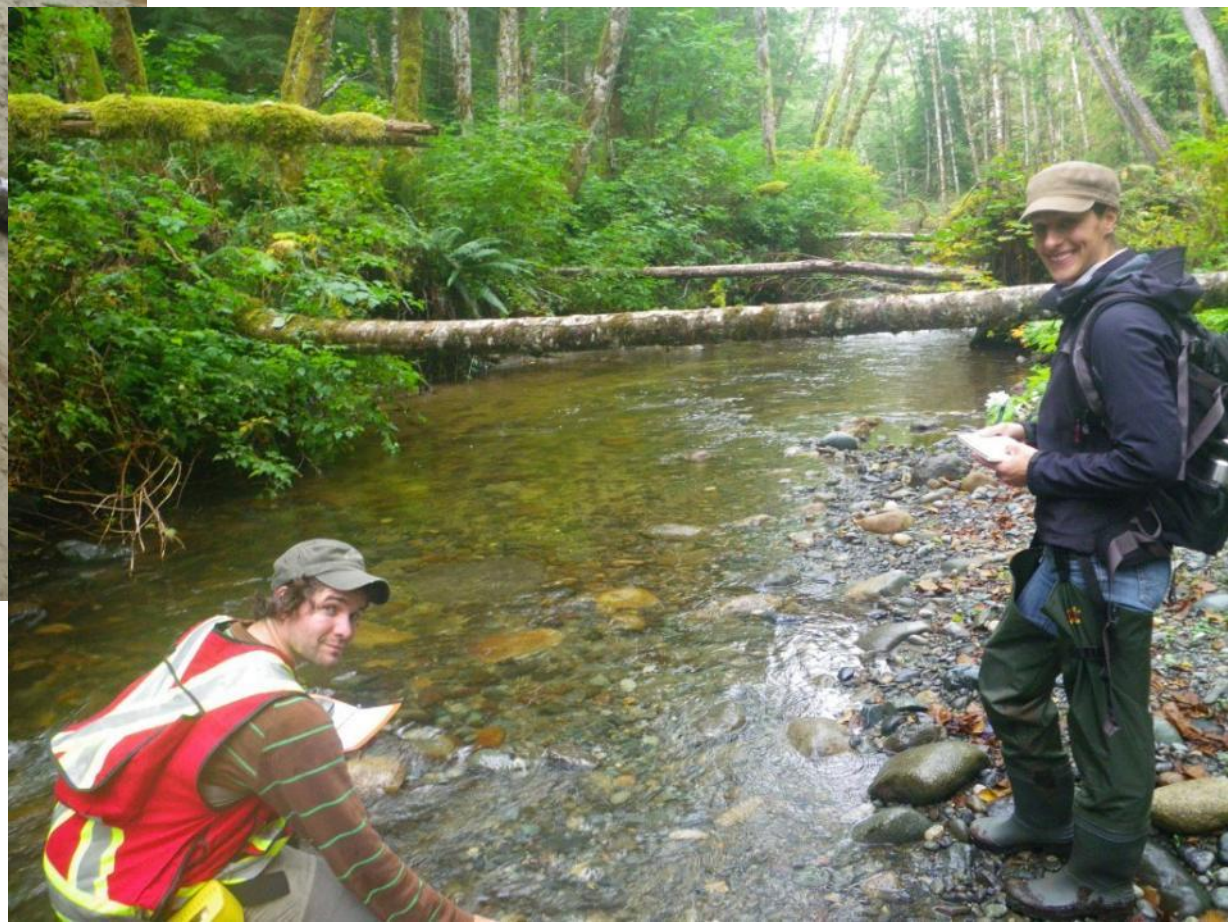
More flow nets



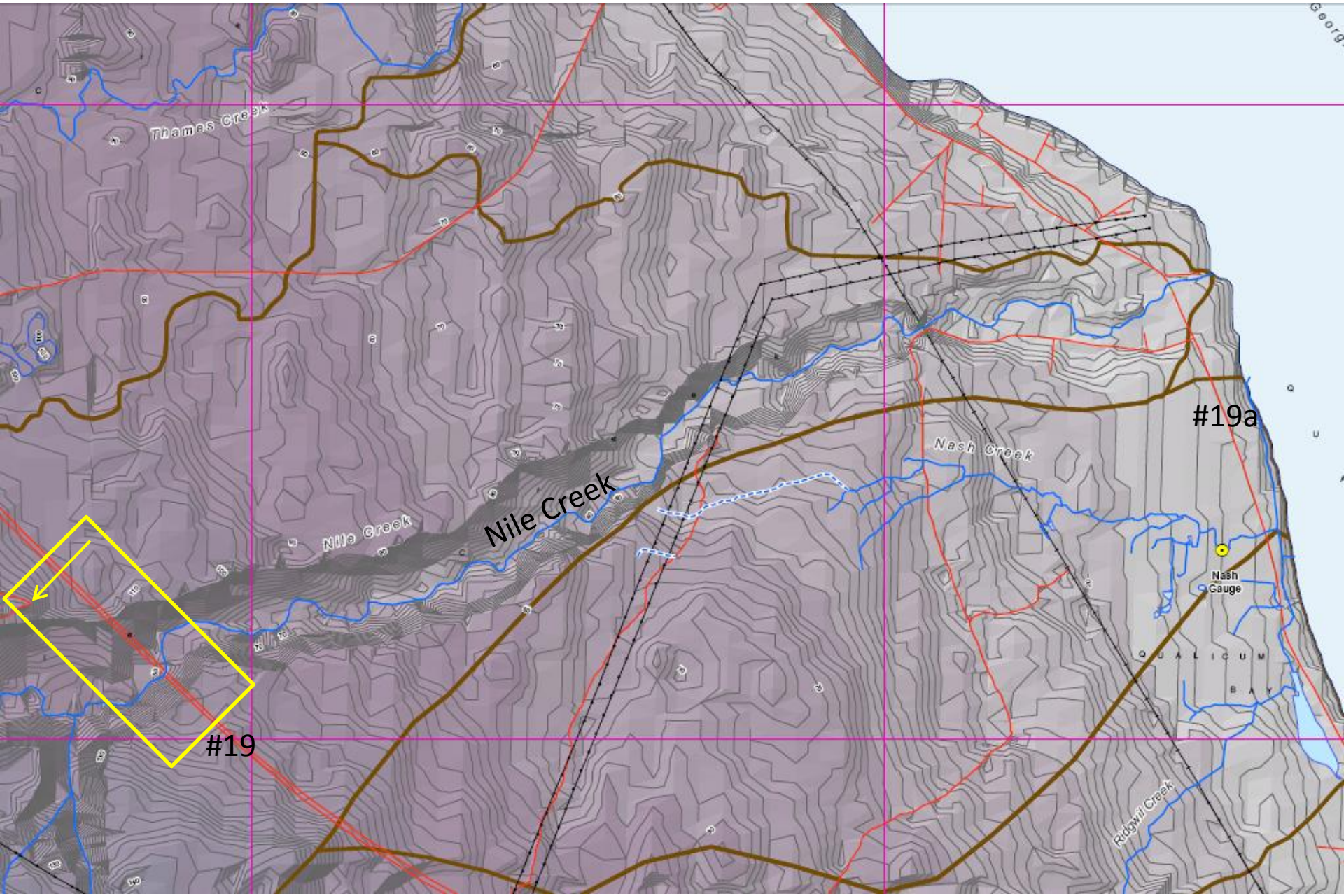

Thomas Creek
Nile Creek
Nile Creek
Nash Creek
#19a
Nash Gauge
#19
Ridgvil Creek


Image © 2011 IMTCAN
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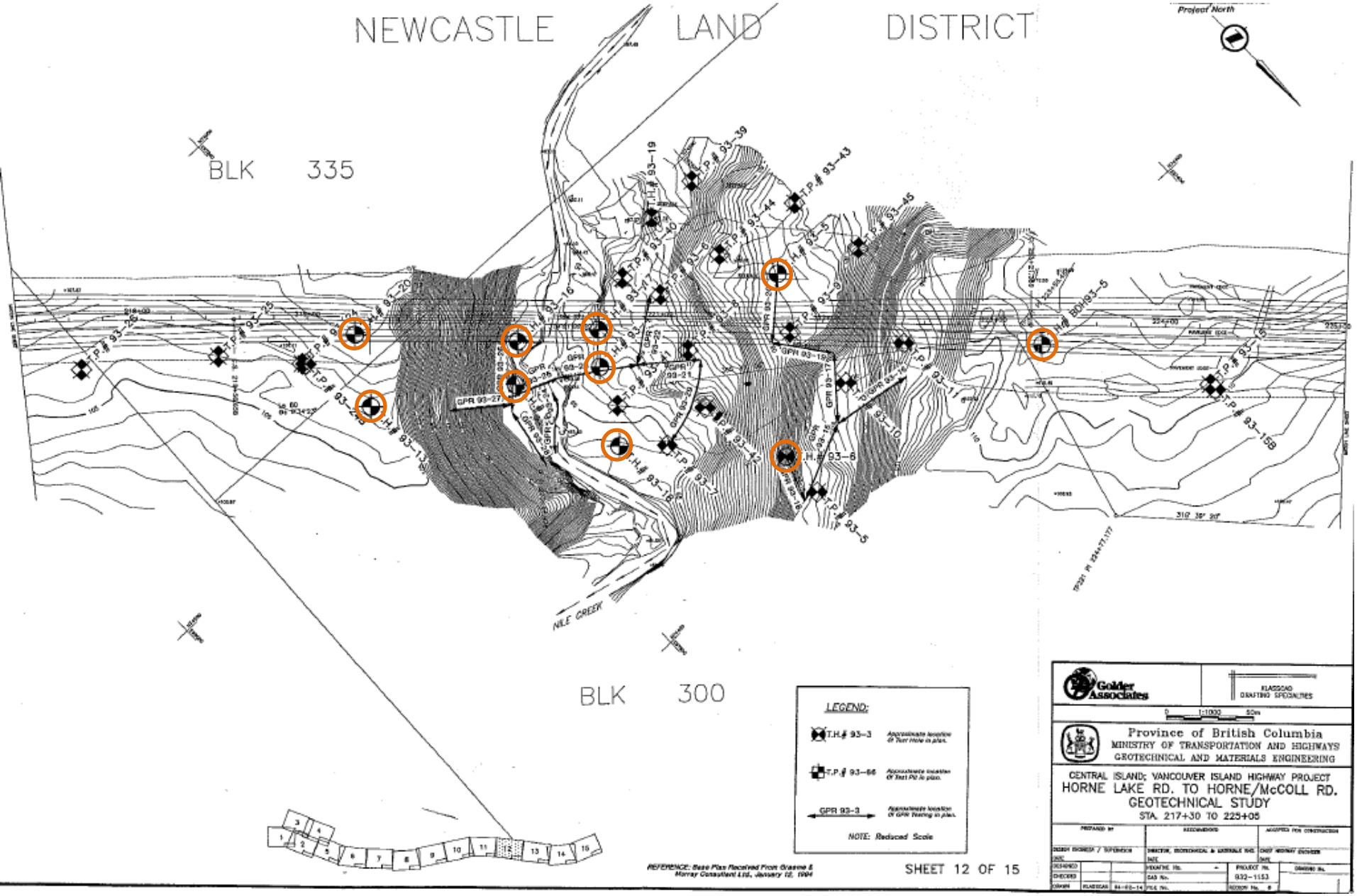

NEWCASTLE LAND DISTRICT
Project North
BLK 335
BLK 300
NILE CREEK
LEGEND:
T.H.# 93-3 Approximate location of Test Hole in plan.
T.P.# 93-66 Approximate location of Test Pit in plan.
GPR 93-3 Approximate location of GPR Testing in plan.
NOTE: Reduced Scale
REFERENCE: Base Plan Received From Graeme & Murray Consultant Ltd., January 12, 1994
SHEET 12 OF 15
Golder Associates
KLASSEAD DRAFTING SPECIALTIES
1:1000
Province of British Columbia
MINISTRY OF TRANSPORTATION AND HIGHWAYS
GEOTECHNICAL AND MATERIALS ENGINEERING
CENTRAL ISLAND; VANCOUVER ISLAND HIGHWAY PROJECT
HORNE LAKE RD. TO HORNE/McCOLL RD.
GEOTECHNICAL STUDY
STA. 217+30 TO 225+05
PREPARED BY
RECOMMENDED
ACCEPTED FOR CONSTRUCTION
DESIGN ENGINEER / SUPERVISOR
DIRECTOR, GEOTECHNICAL & MATERIALS BRS
CHIEF HIGHWAY ENGINEER
DESIGNED
DRAWN
CHECKED
CDRAWN
KLASSEAD 94-10-14
PROJECT No. 932-1153
DRAWING No.
DESIGN No. 0

Ministry of Transportation and Highways

SUMMARY LOG

Geotechnical and Materials Branch

TEST HOLE No. 93-12

Project HORNE LAKE ROAD TO HORNE/McCOLL ROAD – VANCOUVER ISLAND HWY.

Location STA. 212+95, 3m RT. OF C.L. Elevation 112.3m

Driller FOUNDEX Method MUD ROTARY Dates 93-09-30

Drilling Details / Blowcount Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties WL	Index Properties WP	Index Properties W	Classification	Description	Other Tests
													TS — TOPSOIL — 0.15m	
BENTONITE SEAL 0 – 0.6m; 18/.05m REF/ROCK; 19mm PVC STANDPIPE; 34/.15m 68/.15m	1	S	–	.20		21	47	32	–	–	17	SM3	Loose brown silty SAND, some gravel and cobbles, occasional small boulders — 1.2m	
	2											SM4	Dense brown sandy SILT mixture, some gravel and cobbles — 2.4m	
	3	S	>100	.30		15	37	48	–	–	12	SM4	Very hard brown SILT and SAND mixture, trace gravel, some gravelly layers — 3.8m	
	4											ML	Very hard brown fine SILT, some sand, trace clay and gravel — 5.2m	
	5	S	60	.46		2	10	88	–	–	23			
	6	S	24	.46		0	2	98	–	–	25	ML	Very stiff to hard grey SILT, trace clay and sand in mixture	
94-02-11	7	S	58	.30		–	–	–	–	–	17			
93-10-26	8												— 8.2m	
	9	S	21	.46		–	–	–	–	–	–	ML	Very stiff to hard grey sandy SILT mixture, trace clay, gravel, occasional cobbles	
	10													
	11	S	36	.46		–	–	–	–	–	10			
34/.15m 70/.10m	12	S	>100	.15		–	–	–	–	–	–		— 11.9m	
Piez. 47/.15m 70/.15m	13	S	>100	.30		–	–	–	–	–	–	SM2	Very dense grey silty SAND mixture, trace gravel	
	14												13.7m END OF HOLE	
	15													
	16													
	17													

SAMPLE TYPE
A – Auger
C – Core
D – Denison
S – Split Spoon
T – Shelby Tube
W – Wash

SHEAR STRENGTH kPa
U – Unconfined Compression
Fv – Field Vane
Lv – Lab Vane
R – Remoulded

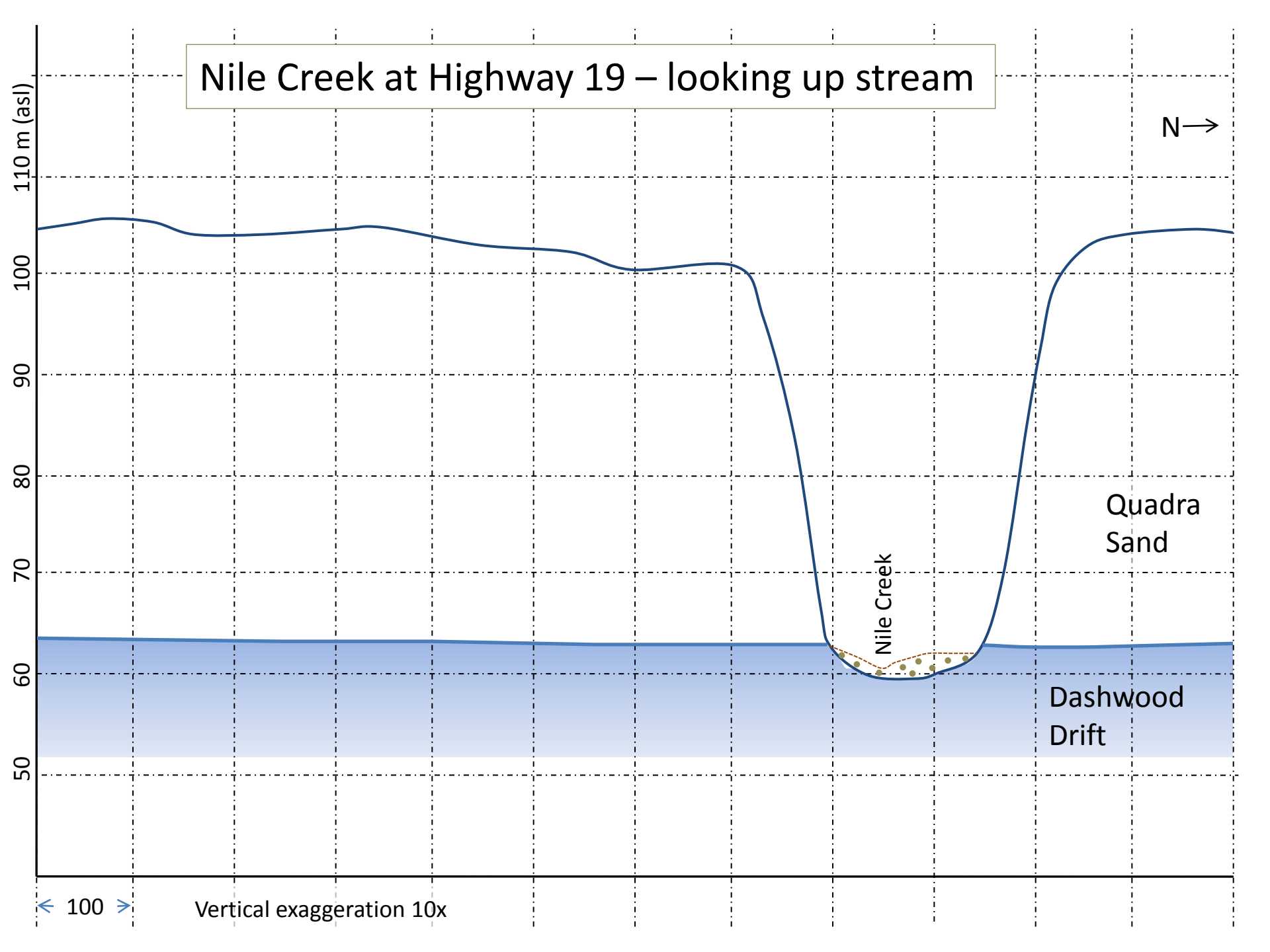
TESTS
M – Mechanical Analysis
Q,R,S – Triaxial Compression
C – Consolidation
DS – Direct Shear
WL,WP – Liquid, Plastic Limits
W – Moisture Content

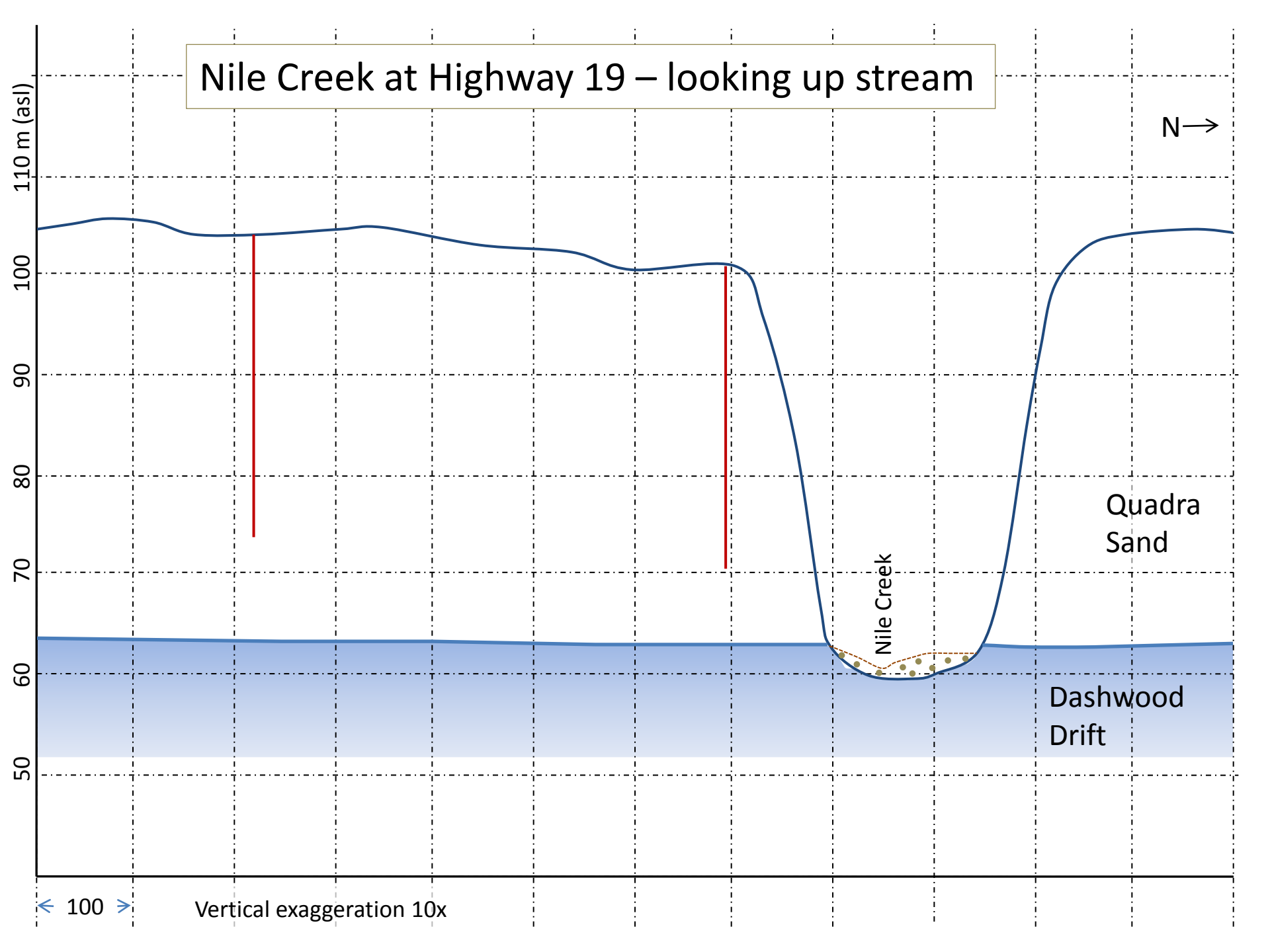
Blowcount – Standard Penetration Test (ASTM 1586)

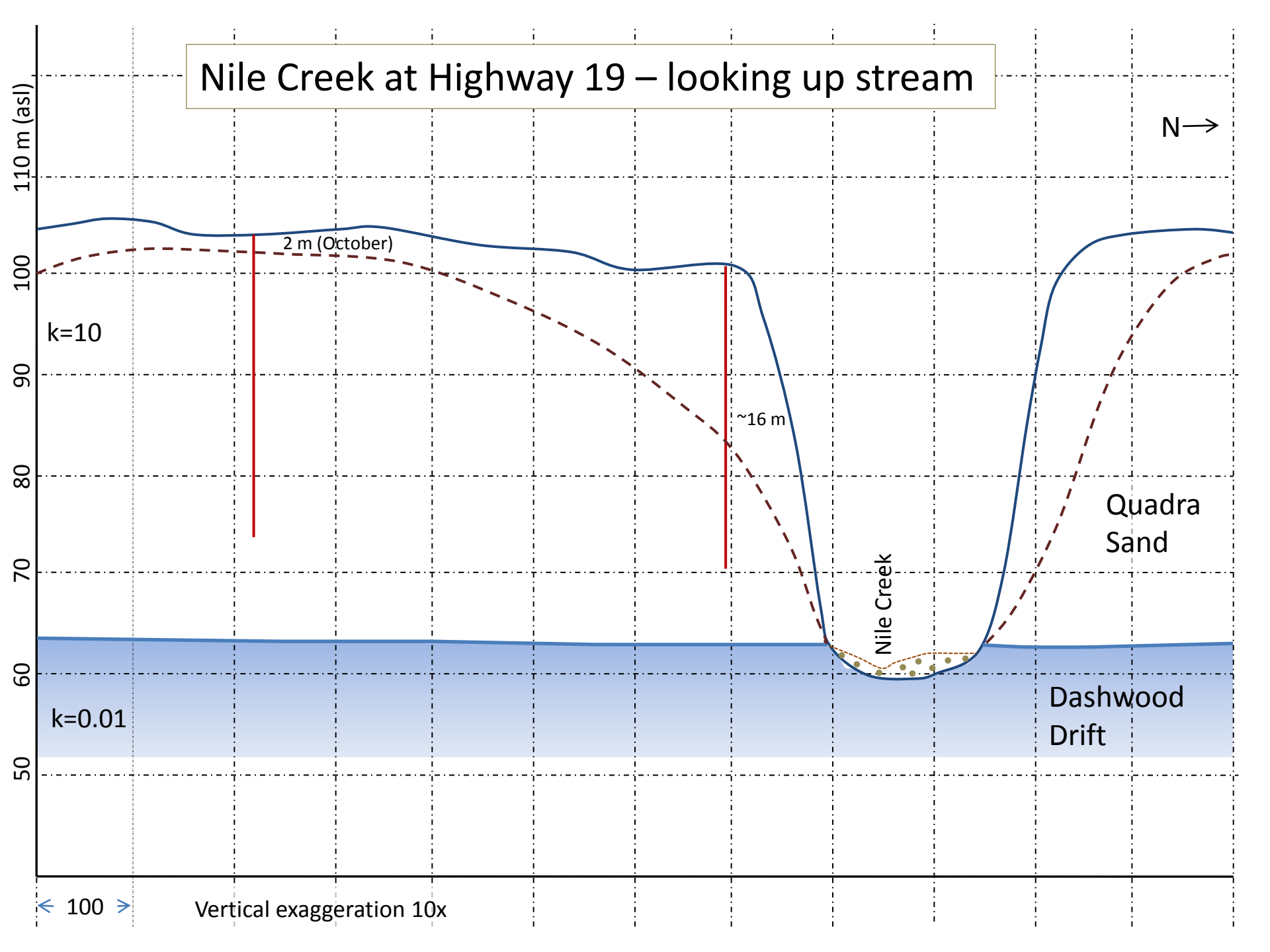
FILE No. 932-1153

PREPARED BY: GOLDER/KLASSCAD

SHEET 01 of 01


Nile Creek at Highway 19 – looking up stream
110 m (asl)
100
90
80
70
60
50
N
Quadra
Sand
Nile Creek
Dashwood
Drift
100
Vertical exaggeration 10x


Nile Creek at Highway 19 – looking up stream
N
110 m (asl)
100
90
80
70
60
50
Quadra Sand
Nile Creek
Dashwood Drift
100
Vertical exaggeration 10x


Nile Creek at Highway 19 – looking up stream
N
110 m (asl)
100
90
80
70
60
50
2 m (October)
k=10
~16 m
Quadra
Sand
Nile Creek
Dashwood
Drift
k=0.01
100
Vertical exaggeration 10x

Determine the flow rate through the flow net

(from Fetter – page 134)

$$q' = (Kph)/f$$

Where:

q' = the discharge per unit width of the aquifer in the 3rd dimension

K = the permeability (cm/s)*

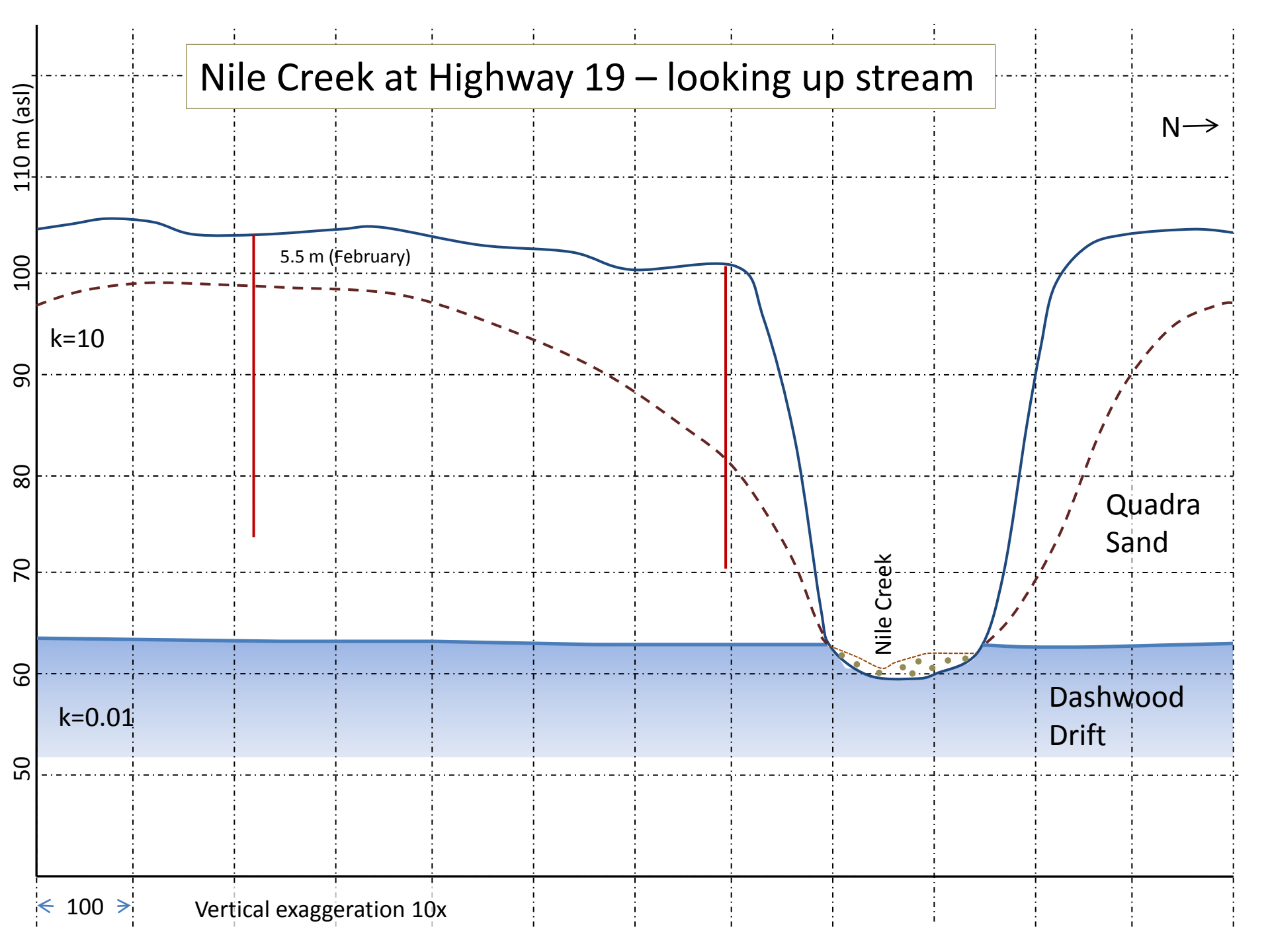
p = the number of flow tubes bounded by adjacent pairs of flow lines

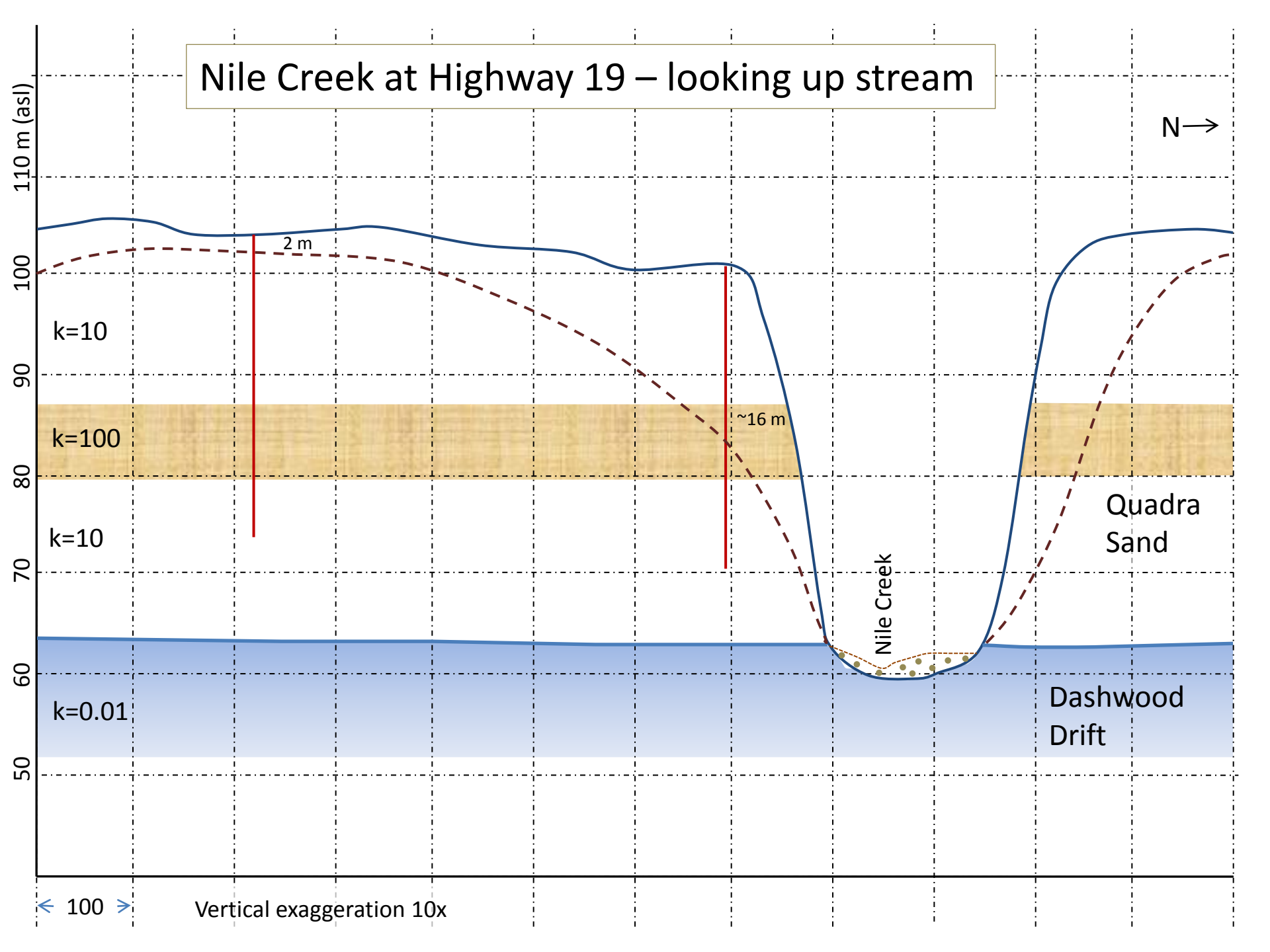
h = the head loss over the length of the flow lines (cm)

f = the number of squares bounded by adjacent flow lines

The result is in cm^2/s but we need to multiply that by 100 cm (unit width of the aquifer) to get flow (cm^3/s) per metre along the third dimension

*For now we'll assume that K = 0.001 cm/s for the silty-sand of the Quadra Sand here


Nile Creek at Highway 19 – looking up stream
N
110 m (asl)
100
90
80
70
60
50
5.5 m (February)
k=10
k=0.01
Nile Creek
Quadra Sand
Dashwood Drift
100
Vertical exaggeration 10x


Nile Creek at Highway 19 – looking up stream
N
110 m (asl)
100
90
80
70
60
50
2 m
~16 m
k=10
k=100
k=10
k=0.01
Nile Creek
Quadra
Sand
Dashwood
Drift
100
Vertical exaggeration 10x