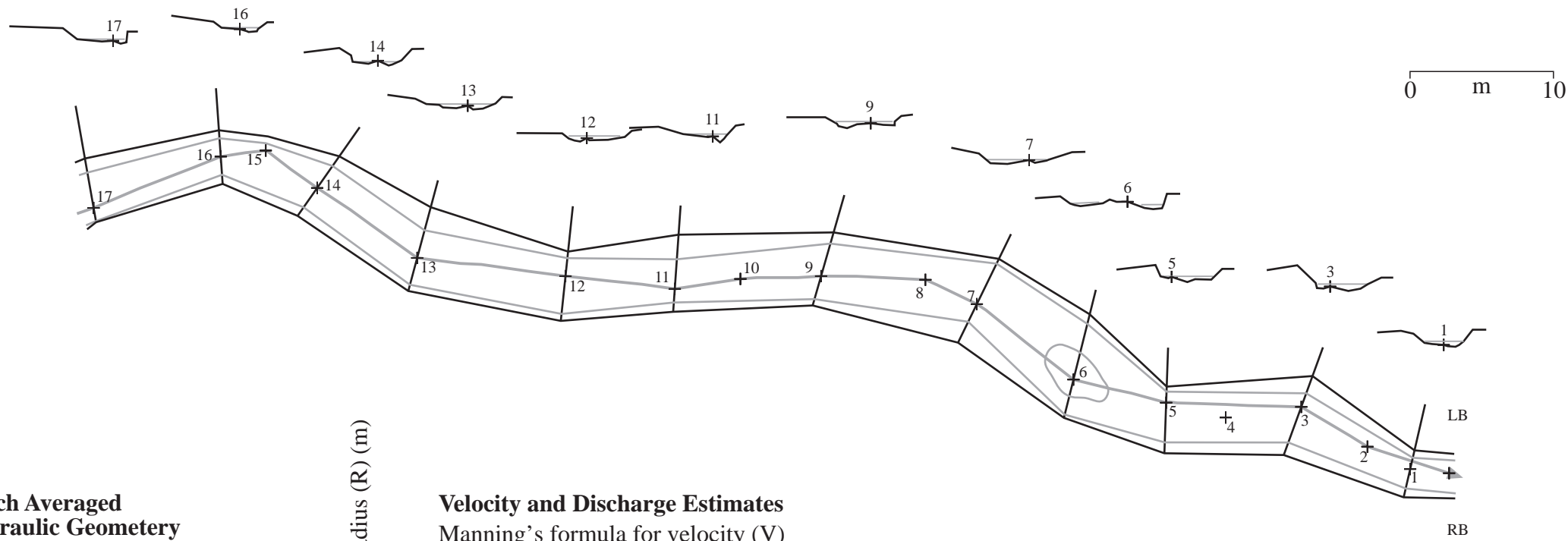


Map 1: Boyd Creek Plan and Cross Sections



Reach Summary

| | |
|---------------------------------|-------|
| Total Height, H (m) | 4.94 |
| Total Distance, D (m) | 101.3 |
| Reach slope, H/D (m/m) | 0.05 |
| Effective slope, (H-Σh)/D (m/m) | 0.02 |

Step geometry

| Steps | Height, h (m) | Pools | Scour Depth (m) |
|---------|---------------|---------|-----------------|
| S9-S8 | 0.28 | S9 | 0.18 |
| S8-S7 | 0.41 | S8 | 0.4 |
| S7-S6 | 0.34 | S7 | 0.5 |
| S6-S5 | 0.5 | S6 | 0.05 |
| S5-S4 | 0.2 | S5 | 0.36 |
| S4-run | 0.19 | S4 | 0.28 |
| S3-run | 0.3 | S3 | 0.59 |
| S2-run | 0.45 | S2 | 0.43 |
| S1-run | 0.16 | S1 | 0.12 |
| Sum | 2.83 | Average | 0.32 |
| Average | 0.31 | | |
| Σh/H | 0.57 | | |

Reach Averaged Hydraulic Geometry

| | Width (m) | | Area (m ²) | Hydraulic radius (R) (m) |
|---------------|-----------|------|------------------------|--------------------------|
| | Max. | Av. | | |
| Bankful (B) | 5.03 | 0.85 | 0.56 | 2.78 |
| Trimline (TL) | 3.66 | 0.38 | 0.19 | 0.69 |

Velocity and Discharge Estimates

Manning's formula for velocity (V)

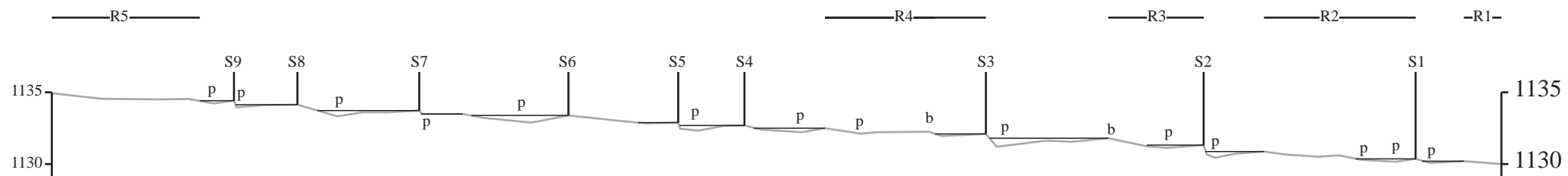
$$V = 1/n * (R^{2/3}) * (S^{1/2})$$

Discharge (Q) = Area*Velocity

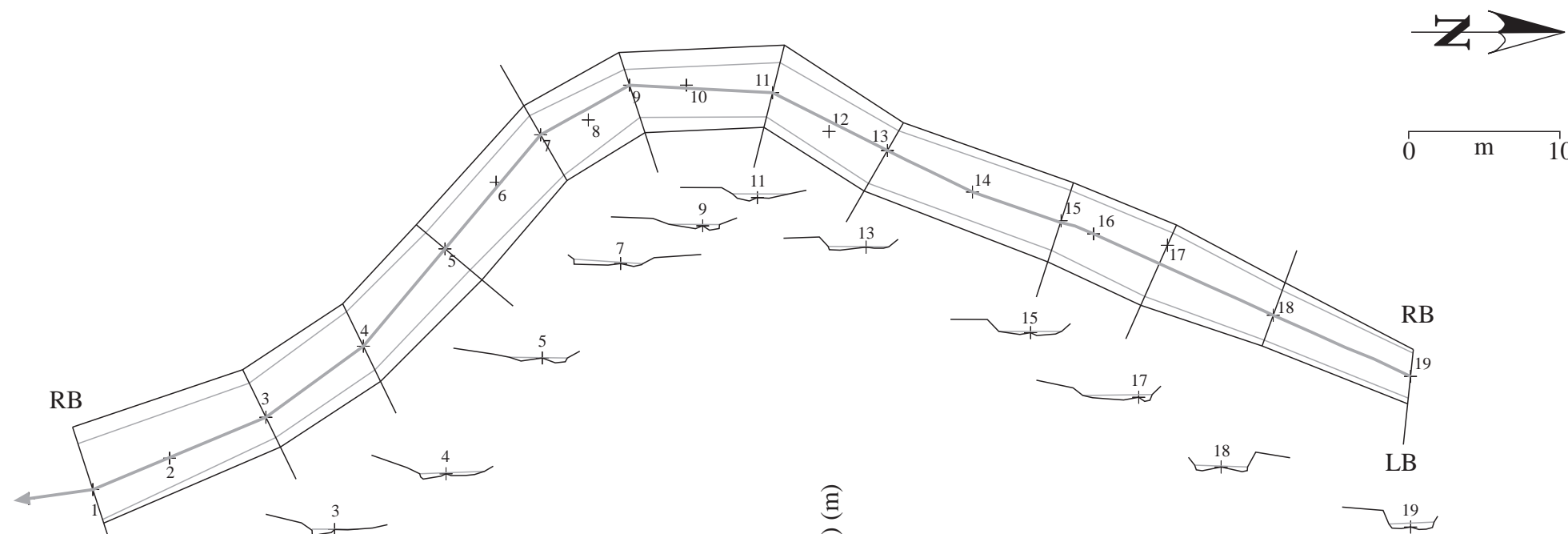
| | |
|--|------|
| Reach slope (S _R), (m/m) | 0.05 |
| Effective slope (S _E), (m/m) | 0.02 |
| Manning's "n" | 0.06 |

| | S _E | S _R |
|-------------------------------------|----------------|----------------|
| V _B (m/s) | 1.43 | 2.27 |
| V _{TL} (m/s) | 0.73 | 1.15 |
| Q _B (m ³ /s) | 4.00 | 6.30 |
| Q _{TL} (m ³ /s) | 0.51 | 0.80 |

Boyd Creek Longprofile



Map 2: Norge Creek Plan and Cross Sections



Reach Averaged Hydraulic Geometry

| | Width (m) | | Depth (m) | | Area (m ²) | Hydraulic radius (R) (m) |
|---------------|-------------|---------------|-----------|---------|------------------------|--------------------------|
| | Bankful (B) | Trimline (TL) | Max. | Average | | |
| Bankful (B) | 5.57 | 3.93 | 0.79 | 0.50 | 2.70 | 0.44 |
| Trimline (TL) | 3.93 | 3.93 | 0.37 | 0.20 | 0.78 | 0.18 |

Velocity and Discharge Estimates

Manning's formula for velocity (V)

$$V = 1/n * (R^{2/3}) * (S^{1/2})$$

Discharge (Q) = Area * Velocity

| | |
|--|------|
| Reach slope (S _R), (m/m) | 0.05 |
| Effective slope (S _E), (m/m) | 0.02 |
| Manning's "n" | 0.06 |

| | S _E | S _R |
|-------------------------------------|----------------|----------------|
| V _B (m/s) | 1.37 | 2.17 |
| V _{TL} (m/s) | 0.76 | 1.20 |
| Q _B (m ³ /s) | 3.70 | 5.90 |
| Q _{TL} (m ³ /s) | 0.59 | 0.93 |

Reach Summary

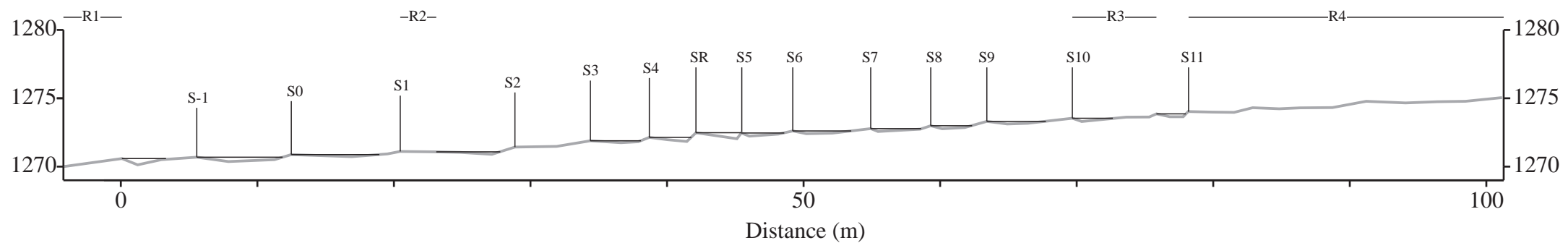
| | |
|--------------------------------|--------|
| Total height, H (m) | 5.05 |
| Total distance, D (m) | 105.35 |
| Reach slope, H/D (m/m) | 0.05 |
| Effective slope, (H-h)/D (m/m) | 0.02 |

Step Geometry

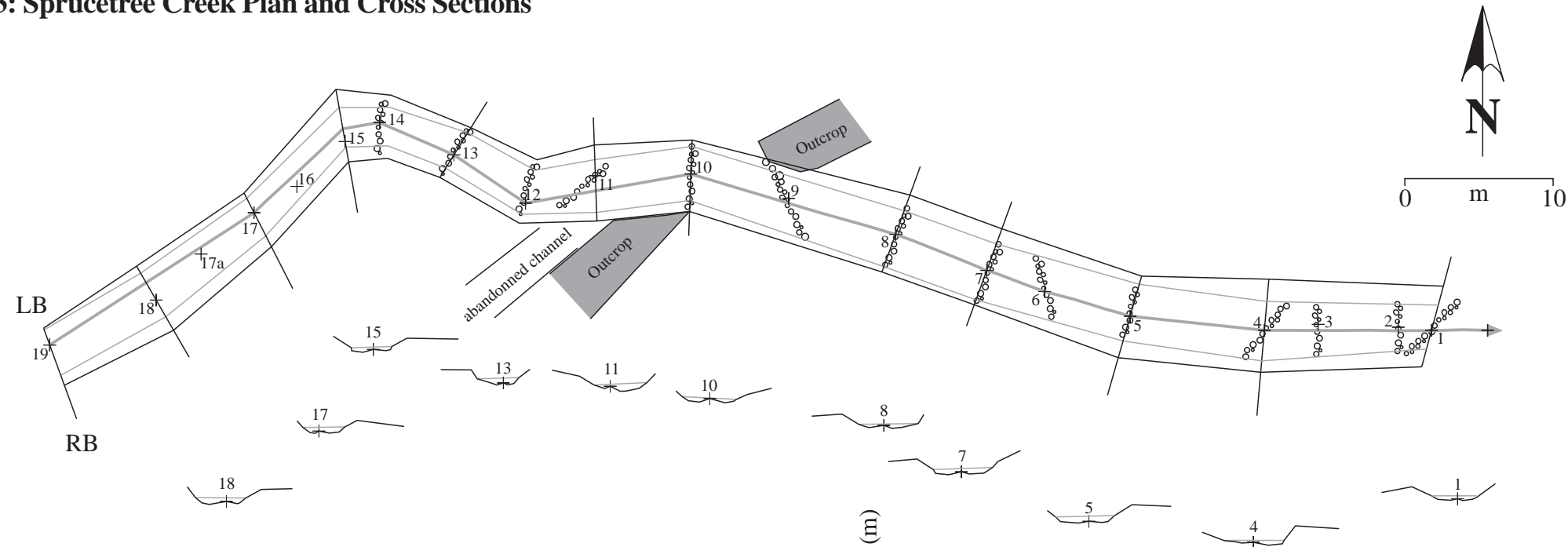
| Steps | Height, h (m) | Pools | Scour Depth(m) |
|---------|---------------|---------|----------------|
| 11-run | 0.17 | 11 | 0.21 |
| 10-9 | 0.23 | 10 | 0.19 |
| 9-8 | 0.32 | 9 | 0.22 |
| 8-7 | 0.21 | 8 | 0.21 |
| 7-6 | 0.17 | 7 | 0.2 |
| 6-5 | 0.15 | 6 | 0.23 |
| 5-SR | -0.02 | 5 | 0.44 |
| SR-4 | 0.34 | SR | 0.3 |
| 4-3 | 0.25 | 4 | 0.14 |
| 3-2 | 0.46 | 3 | 0 |
| 2-run | 0.35 | 2 | 0.18 |
| 1-0 | 0.23 | 1 | 0.15 |
| 0- -1 | 0.19 | 0 | 0.32 |
| -1-run | 0.1 | -1 | 0.46 |
| sum | 3.15 | Average | 0.23 |
| Average | 0.23 | | |
| h/H | 0.62 | | |

| Runs | Length (m) |
|---------------------|------------|
| 4 | 23.1 |
| 3 | 6.2 |
| 2 | 2.6 |
| 1 | 4.3 |
| Total | 36.2 |
| Proportion of reach | 0.34 |

Norge Creek Longprofile



Map 3: Sprucetree Creek Plan and Cross Sections



Reach Summary

| | |
|--------------------------------|-------|
| Total height, H (m) | 4.44 |
| Total distance, D (m) | 105.1 |
| Reach slope, H/D (m/m) | 0.04 |
| Effective slope, (H-h)/D (m/m) | 0.01 |

Step Geometry

| Steps | Height, h (m) | Pools | Scour Depth(m) |
|---------|---------------|---------|----------------|
| 15-14 | 0.34 | 15 | 0.34 |
| 14-13 | 0.11 | 14 | 0.37 |
| 13-12 | 0.47 | 13 | 0.2 |
| 12-11 | 0.33 | 12 | 0.3 |
| 11-10 | 0.35 | 11 | 0.26 |
| 10-9 | 0.56 | 10 | 0.18 |
| 9-8 | 0.24 | 9 | 0.29 |
| 8-7 | 0.22 | 8 | 0.26 |
| 7-6 | 0.22 | 7 | 0.27 |
| 6-5 | 0.16 | 6 | 0.21 |
| 5-4 | 0.32 | 5 | 0.1 |
| 4-3 | 0.07 | 4 | 0.22 |
| 3-2 | 0.23 | 3 | 0.18 |
| 2-1 | 0.16 | 2 | 0.32 |
| 1-0 | 0.11 | 1 | 0.31 |
| sum | 3.89 | Average | 0.25 |
| Average | 0.26 | | |
| h/H | 0.88 | | |

Reach Averaged Hydraulic Geometry

| | Width (m) | | Depth (m) | | Area (m ²) | Hydraulic radius (R) (m) |
|---------------|-------------|---------------|-----------|------|------------------------|--------------------------|
| | Bankful (B) | Trimline (TL) | Max. | Av. | | |
| Bankful (B) | 4.92 | 3.44 | 0.92 | 0.65 | 3.16 | 0.56 |
| Trimline (TL) | | | 0.39 | 0.27 | 0.93 | 0.25 |

Velocity and Discharge Estimates

Manning's formula for velocity (V)

$$V = 1/n * (R^{2/3}) * (S^{1/2})$$

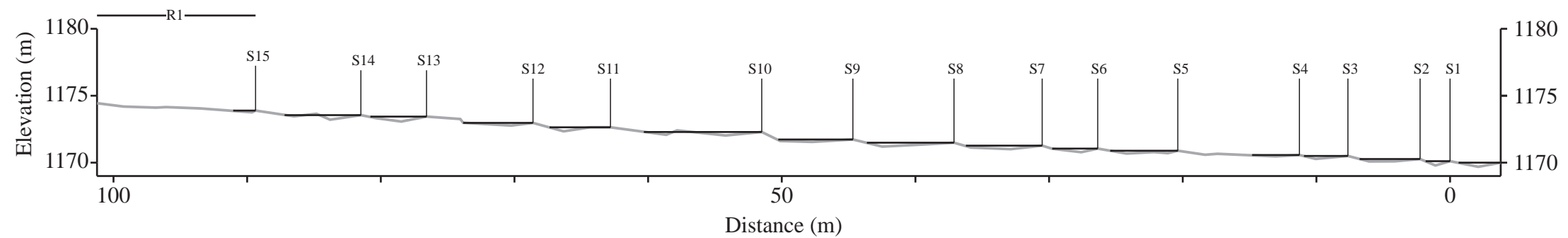
Discharge (Q) = Area*Velocity

| | |
|--|------|
| Reach slope (S _R), (m/m) | 0.04 |
| Effective slope (S _E), (m/m) | 0.01 |
| Manning's "n" | 0.06 |

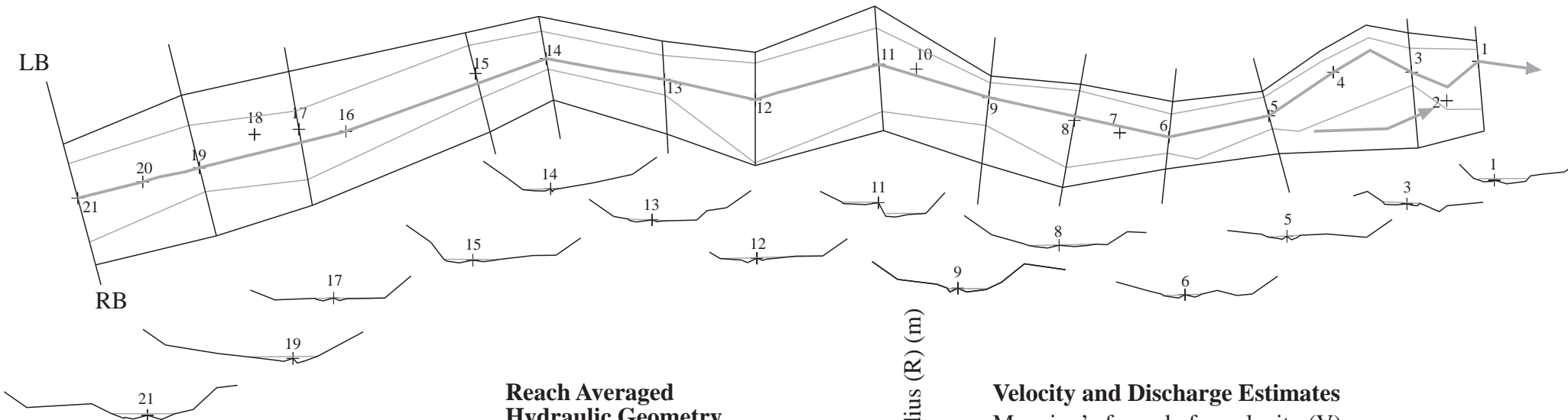
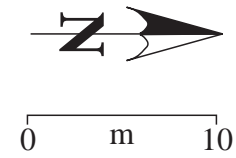
| | S _E | S _R |
|-------------------------------------|----------------|----------------|
| V _B (m/s) | 1.13 | 2.27 |
| V _{TL} (m/s) | 0.66 | 1.31 |
| Q _B (m ³ /s) | 3.60 | 7.20 |
| Q _{TL} (m ³ /s) | 0.61 | 1.22 |

| Runs | Length (m) |
|---------------------|------------|
| 1 | 11.9 |
| Total | 11.9 |
| Proportion of reach | 0.11 |

Sprucetree Creek Longprofile



Map 4: Cabin Creek Plan and Cross Sections



Reach Averaged Hydraulic Geometry

| | Width (m) | | Depth (m) | | Area (m ²) | Hydraulic radius (R) (m) |
|---------------|-------------|---------------|-----------|------|------------------------|--------------------------|
| | Bankful (B) | Trimline (TL) | Max. | Av. | | |
| Bankful (B) | 8.16 | 3.67 | 0.80 | 0.49 | 4.08 | 0.46 |
| Trimline (TL) | 3.67 | 0.25 | 0.14 | 0.14 | 0.54 | 0.14 |

Velocity and Discharge Estimates

Manning's formula for velocity (V)
 $V = 1/n * (R^{2/3}) * (S^{1/2})$

Discharge (Q) = Area * Velocity

| | |
|--|------|
| Reach slope (S _R), (m/m) | 0.11 |
| Effective slope (S _E), (m/m) | 0.04 |
| Manning's "n" | 0.06 |

| | S _E | S _R |
|-------------------------------------|----------------|----------------|
| V _B (m/s) | 1.99 | 3.29 |
| V _{TL} (m/s) | 0.88 | 1.47 |
| Q _B (m ³ /s) | 8.10 | 13.4 |
| Q _{TL} (m ³ /s) | 0.47 | 0.79 |

Reach Summary

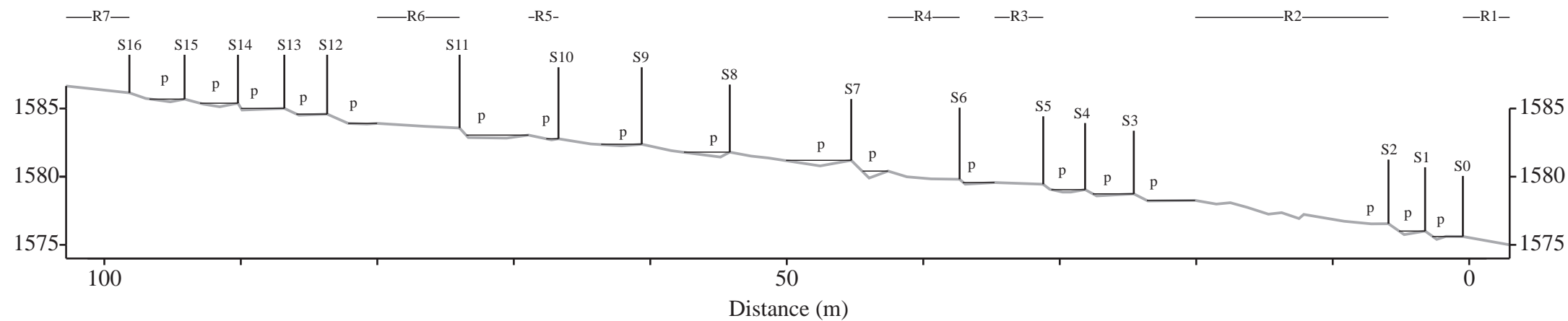
| | |
|--------------------------------|-------|
| Total height, H (m) | 11.65 |
| Total distance, D (m) | 105.8 |
| Reach slope, H/D (m/m) | 0.11 |
| Effective slope, (H-h)/D (m/m) | 0.04 |

Step Geometry

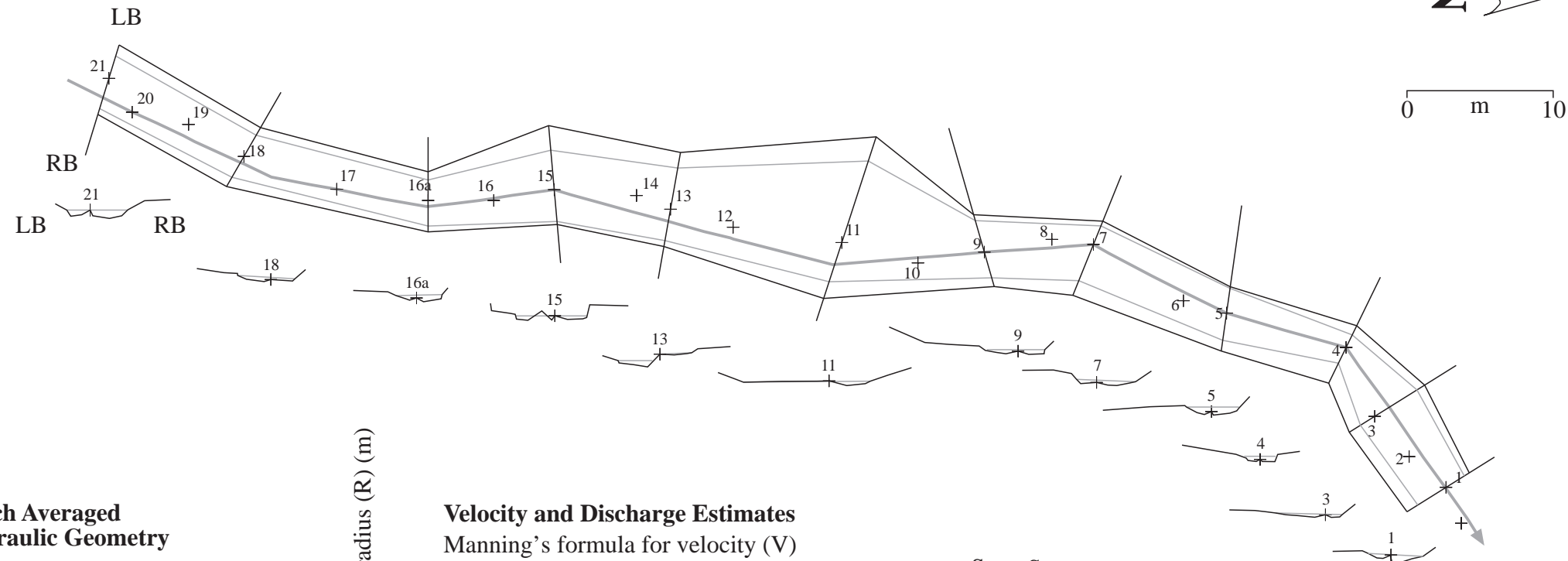
| Steps | Height, h (m) | Pools | Scour Depth(m) |
|---------|---------------|---------|----------------|
| 16-15 | 0.46 | 16 | 0.2 |
| 15-14 | 0.3 | 15 | 0.26 |
| 14-13 | 0.38 | 14 | 0.12 |
| 13-12 | 0.42 | 13 | 0.08 |
| 12-run | 0.68 | 12 | 0.05 |
| 11-run | 0.52 | 11 | 0.22 |
| 10-9 | 0.4 | 10 | 0.12 |
| 9-8 | 0.58 | 9 | 0.36 |
| 8-7 | 0.6 | 8 | 0.41 |
| 7-run | 0.79 | 7 | 0.51 |
| 6-5 | 0.01 | 6 | 0.36 |
| 5-4 | 0.4 | 5 | 0.18 |
| 4-3 | 0.31 | 4 | 0.15 |
| 3-run | 0.48 | 3 | 0.04 |
| 2-1 | 0.54 | 2 | 0.26 |
| 1-0 | 0.4 | 1 | 0.21 |
| sum | 7.27 | Average | 0.22 |
| Average | 0.45 | | |
| h/H | 0.62 | | |

| Runs | Length (m) |
|---------------------|------------|
| 7 | 4.6 |
| 6 | 6 |
| 5 | 2.2 |
| 4 | 5.4 |
| 3 | 3.6 |
| 2 | 14.2 |
| 1 | 3.4 |
| Total | 39.4 |
| Proportion of reach | 0.37 |

Cabin Creek Longprofile



Map 5: Couldrey Creek Plan and Cross Sections



Reach Averaged Hydraulic Geometry

| | Width (m) | Depth (m) | Area (m ²) | Hydraulic radius (R) (m) |
|---------------|-----------|-----------|------------------------|--------------------------|
| | Max. | Av. | | |
| Bankful (B) | 5.23 | 0.77 | 0.48 | 2.55 |
| Trimline (TL) | 3.87 | 0.40 | 0.24 | 0.91 |

Velocity and Discharge Estimates

Manning's formula for velocity (V)

$$V = 1/n * (R^{2/3}) * (S^{1/2})$$

Discharge (Q) = Area * Velocity

| | |
|--|------|
| Reach slope (S _R), (m/m) | 0.10 |
| Effective slope (S _E), (m/m) | 0.02 |
| Manning's "n" | 0.06 |

| | S _E | S _R |
|-------------------------------------|----------------|----------------|
| V _B (m/s) | 1.33 | 2.98 |
| V _{TL} (m/s) | 0.84 | 1.89 |
| Q _B (m ³ /s) | 3.40 | 7.60 |
| Q _{TL} (m ³ /s) | 0.76 | 1.71 |

Reach Summary

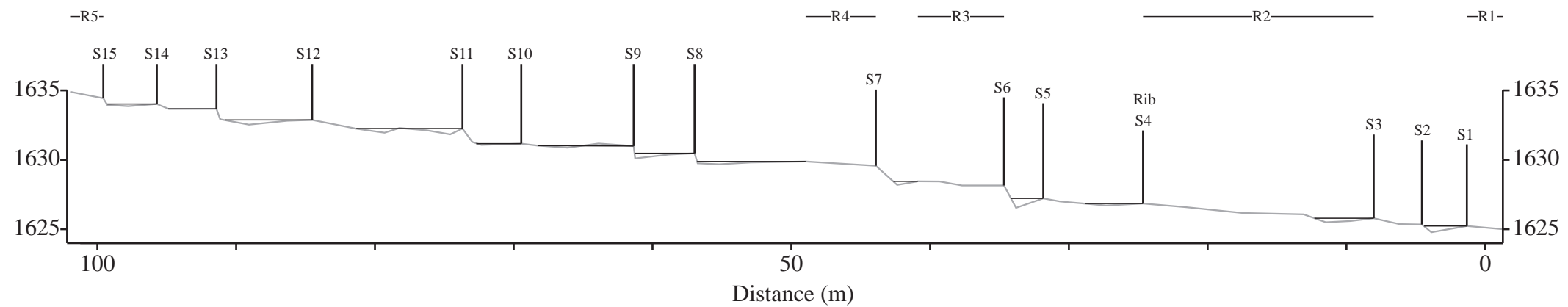
| | |
|--------------------------------|-------|
| Total height, H (m) | 9.9 |
| Total distance, D (m) | 103.9 |
| Reach slope, H/D (m/m) | 0.10 |
| Effective slope, (H-h)/D (m/m) | 0.02 |

Step Geometry

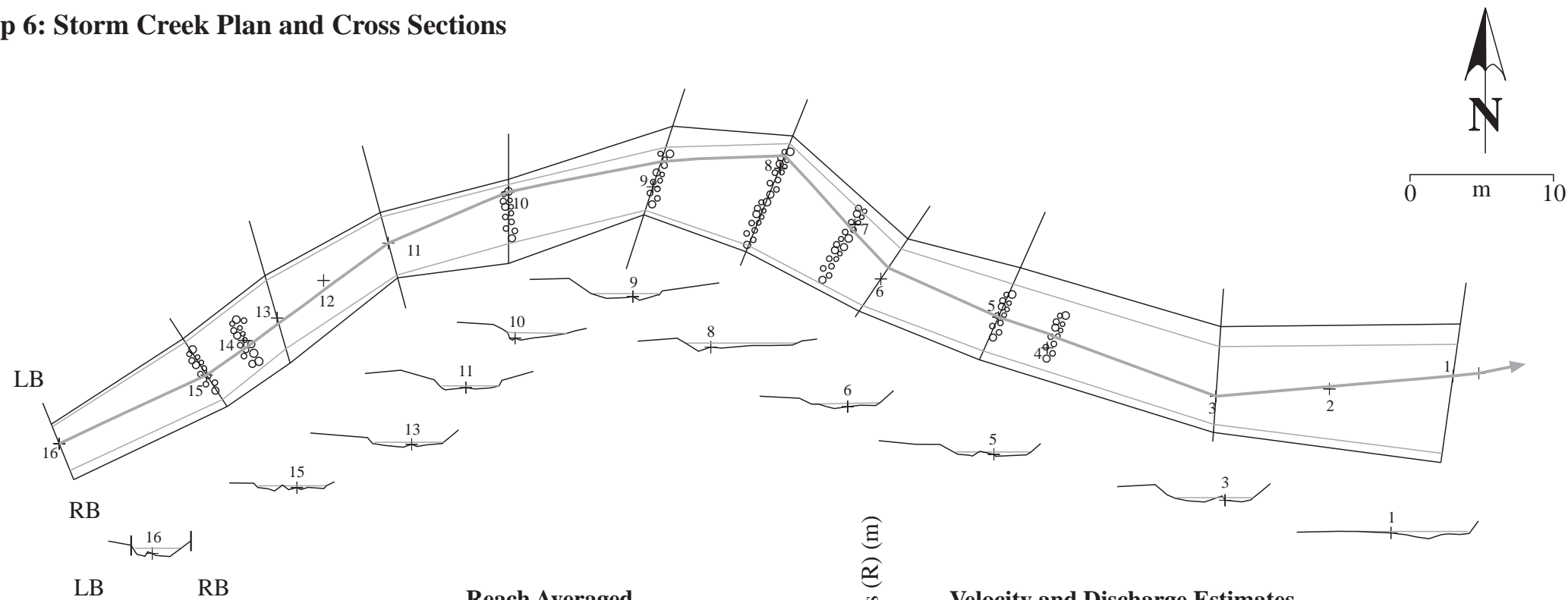
| Steps | Height, h (m) | Pools | Scour Depth(m) |
|---------|---------------|---------|----------------|
| 15-14 | 0.41 | 15 | 0.16 |
| 14-13 | 0.35 | 14 | 0.01 |
| 13-12 | 0.8 | 13 | 0.34 |
| 12-11 | 0.62 | 12 | 0.42 |
| 11-10 | 1.09 | 11 | 0.09 |
| 10-9 | 0.17 | 10 | 0.12 |
| 9-8 | 0.52 | 9 | 0.37 |
| 8-run | 0.59 | 8 | 0.2 |
| 7-run | 1.12 | 7 | 0.26 |
| 6-5 | 0.93 | 6 | 0.68 |
| 5-run | 0.37 | 5 | 0.14 |
| 3-2 | 0.45 | 3 | 0 |
| 2-1 | 0.11 | 2 | 0.45 |
| sum | 7.53 | Average | 0.25 |
| Average | 0.58 | | |
| h/H | 0.76 | | |

| Runs | Length (m) |
|---------------------|------------|
| 5 | 2.4 |
| 4 | 5.1 |
| 3 | 6.2 |
| 2 | 16.6 |
| 1 | 2.6 |
| Total | 32.9 |
| Proportion of reach | 0.32 |

Couldrey Creek Longprofile



Map 6: Storm Creek Plan and Cross Sections



Reach Summary

| | |
|--------------------------------|-------|
| Total height, H (m) | 2.75 |
| Total distance, D (m) | 109.2 |
| Reach slope, H/D (m/m) | 0.03 |
| Effective slope, (H-h)/D (m/m) | 0.01 |

Step Geometry

| Steps | Height, h (m) | Pools | Scour Depth(m) |
|---------|---------------|---------|----------------|
| 9-8 | 0 | 9 | 0.94 |
| 8-7 | 0.2 | 8 | 0.22 |
| 7-run | 0.38 | 7 | 0.53 |
| 6-5 | 0.28 | 6 | 0.12 |
| 5-4 | 0.2 | 5 | 0.21 |
| 4-3 | 0.37 | 4 | 0.12 |
| 3-2 | 0.19 | 3 | 0.11 |
| 2-run | 0 | 2 | 0 |
| sum | 1.62 | Average | 0.28 |
| Average | 0.20 | | |
| h/H | 0.59 | | |

Reach Averaged Hydraulic Geometry

| | Width (m) | | Depth (m) | | Area (m ²) | Hydraulic radius (R) (m) |
|---------------|-----------|------|-----------|------|------------------------|--------------------------|
| | Max. | Av. | Max. | Av. | | |
| Bankful (B) | 6.52 | 0.78 | 0.51 | 3.40 | 0.47 | |
| Trimline (TL) | 4.91 | 0.39 | 0.23 | 1.10 | 0.21 | |

Velocity and Discharge Estimates

Manning's formula for velocity (V)

$$V = 1/n * (R^{2/3}) * (S^{1/2})$$

Discharge (Q) = Area*Velocity

Reach slope (S_R), (m/m) 0.03

Effective slope (S_E), (m/m) 0.01

Manning's "n" 0.06

| | S _E | S _R |
|-------------------------------------|----------------|----------------|
| V _B (m/s) | 1.01 | 1.74 |
| V _{TL} (m/s) | 0.59 | 1.03 |
| Q _B (m ³ /s) | 3.40 | 5.90 |
| Q _{TL} (m ³ /s) | 0.65 | 1.13 |

Storm Creek Longprofile

