Appendix 5: Stormwater Drawings

Includes:

1) Stormwater plans - Sheets DR01 to DR08

2) Stormwater details
   a) Sheet DR10, fish passage example through round culverts (at 2% stream grade and 4% stream grade)
   b) Sheet DR11, fish passage example through box culverts (at 1% stream grade)
   c) Sheet DR12, example stream diversion, based on the Gear Stream realignment
   d) Sheet DR13, typical culvert layout
   e) Sheet DR14, typical swale details
   f) Sheet DR15, typical attenuation swale details
   g) Sheets DR16, example attenuation basin, based on the Kennedy Wetland
For Discussion Purposes Only And Subject To Change.
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And Subject To Change.
EXAMPLE DESIGN OF CULVERT WHERE STREAM BED IS AT 2% GRADE - LONGITUDINAL SECTION

Minimum water level - Designed so minimum ponded depth = 200mm

ENERGY DISSIPATION TO BE SPECIFICALLY DESIGNED

Note: Point 'A' is to be within 100mm of the level at Point 'B'.

Angular Rocks, $D_{95} = 150$mm (100mm to 200mm). Rocks to be packed tightly together so gaps between them is 30mm to 50mm. Rocks to be embedded by 50% into the concrete. No rocks required on the upstream face.

Note: Rock protection in front of the wingwall not shown.

EXISTING STREAM BED @ 2% GRADE

INLET STRUCTURE PLAN (2% GRADE)

VIEW OF CULVERT OUTLET

OUTLET STRUCTURE SECTION (2% GRADE)

Minimum water level - Designed so minimum ponded depth = 200mm

Note: Point 'A' is to be within 100mm of the level at Point 'B'.

Energy dissipation to be specifically designed

Angular Rocks, $D_{95} = 150$mm (100mm to 200mm). Rocks to be packed tightly together so gaps between them is 30mm to 50mm. Rocks to be embedded by 50% into the concrete. No rocks required on the upstream face.

Note: Rock protection in front of the wingwall not shown.

EXISTING STREAM BED @ 4% GRADE

INLET STRUCTURE SECTION (2% GRADE)

VIEW OF CULVERT INLET

OUTLET STRUCTURE SECTION (2% GRADE)

Minimum water level - Designed so minimum ponded depth = 200mm

Energy dissipation to be specifically designed

Angular Rocks, $D_{95} = 150$mm (100mm to 200mm). Rocks to be packed tightly together so gaps between them is 30mm to 50mm. Rocks to be embedded by 50% into the concrete. No rocks required on the upstream face.

Note: Rock protection in front of the wingwall not shown.

EXISTING STREAM BED @ 2% GRADE
Low flow channel

Transition from existing stream over 5m

Existing stream bed

30,000

15,000

PLAN
Scale 1:100(A1), 1:200(A3)

Box culvert at 1.5% grade

Stream bank side culvert up to 500mm high

400 Dia. boulder rows @ nominal 4m centres

Point 'A'

Point 'B'

Note: Point 'A' is to be the same level or lower than point 'B'. Point 'A' being the surface of the low flow channel.

400 Dia. boulder rows

Existing stream bed

EXAMPLE DESIGN OF BOX CULVERT WHERE STREAM BED IS AT 1% GRADE
Scale 1:100(A1), 1:200(A3)

Boulder rows 400 Dia.

50mm of Rip Rap D50 = 30mm embedded into 20mm of concrete whilst concrete is wet.

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DRAINAGE DETAILS
SHEET 2 OF 7 - EXAMPLE FISHPASS DETAILS

5/2664/1/6504 DR11 R1

For Client Review
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K. MERCER 24/7/2012 R.COLES
GEAR STREAM REALIGNMENT PLAN

Scale 1:200(A1), 1:400(A3)

GEAR STREAM TYPICAL SECTION (BASED ON SECTION A - A)

Scale 1:50(A1), 1:100(A3)

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DRRAINAGE DETAILS
SHEET 3 OF 7 - GEAR STREAM DIVERSION
Flow

Existing watercourse

Rock Riprap to be specifically designed

Inlet

Riprap or RST green wall

Outlet

See fish pass typical details for culvert internal arrangements and wingwall/riprap relative levels and slopes

TYPICAL BOX CULVERT PLAN

Scale 1:200(A1), 1:400(A3)

Flow

Existing watercourse

Rock Riprap to be specifically designed

Riprap or RST green wall

Inlet

See fish pass typical details for culvert internal arrangements and wingwall/riprap relative levels and slopes

TYPICAL PIPE CULVERT PLAN

Scale 1:200(A1), 1:400(A3)

Flow

Existing watercourse

Rock Riprap to be specifically designed

Concrete headwall

Outlet

See fish pass typical details for culvert internal arrangements and wingwall/riprap relative levels and slopes

Transition to existing watercourse over 5m length

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DRAINAGE DETAILS
SHEET 4 OF 7 - TYPICAL CULVERT LAYOUT

Scale Project No. Drawing No. Sheet No. Revision

5/2664/1/6504 DR13 R1

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K. MERCER  24/7/2012 R.COLES
1% AEP water level limit (actual level varies across project)

Edge bund

1000

41

1

3

Varies 1000 max.

Existing ground

4.000

110dia. Nexus hi-way subsoil or similar filter material to NZTA F/2

Catchpits as required

600

(Cover)

100

Edge lane line

Crossfall varies

Low planted

Shoulder

Typical verge (1.5m where barrier present)

2000

1m typ.

Top soil

Swale to be planted with wet tolerant species. Planting shown is typical. Refer landscaping

1% AEP water level limit (actual level varies across project)

Emergency spillway to be earth reinforced

Concrete headwall

Concrete headwall

300mm dia. culvert

TYPICAL SWALE - 4m MEDIAN

Scale 1:50(A1), 1:100(A3)

TYPICAL SWALE DISCHARGE PLAN

Scale 1:750(A1), 1:200(A3)

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K. MERCER  24/7/2012 R.COLES
PLANTED WETLAND DETENTION SWALE

Section A

- Compacted earth fill
- End cap drilled with orifice
- 200 series concrete blocks (filled with concrete) or road kerb stone
- Concrete apron
- Top of swale

Section B

- Earth bund spaced at approximately 50m centres along swale drain
- 150mm Top soil
- 200 series concrete blocks
- U-PVC SN16
- 100mmØ U-PVC SN16
- 150mm Top soil

Section C

- Stabilised bund spaced at approximately 50m centres along swale drain
- 150mmØ U-PVC SN16
- 150mm Top soil
- 150mmØ pipe

Swale to be planted with wet tolerant species. Planting shown is typical. Refer landscaping technical report.

Overflow channel

- 4.000
- 1.0m
- End cap drilled with orifice

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DRAINAGE DETAILS

SHEET 6 OF 7 - TYPICAL ATTENUATION SWALE DETAILS

For Client Review

PLOT DATE: 2012

1:25(A1), 1:50(A3) SCALE

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3/2644/16504 DR15 R1

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EXAMPLE PLAN OF ATTENUATION BASIN
BASED ON THE KENNEDY WETLAND
Scale 1:500(A1), 1:1000(A3)

EXAMPLE SECTION THROUGH KENNEDY WETLAND
Scale Vertical 1:50(A1), 1:100(A3)

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DRAINAGE DETAILS
SHEET 7 OF 7 - EXAMPLE ATTENUATION BASIN

For Client Review