APPENDIX 8.3

ASSESSMENT OF ROUTINE RUN-OFF

DRMB METHOD A

Q95 Value (m/s)	Network	Dilution Factor	Detailed assessment Y/N
0.00065	A	1.211	Y
0.00041	B	0.225	Y
0.00138	C	7.675	N

River Ecosystem Class (RE Number)
The small water course and drains are not classified
River Fillan at New Strathfillan Bridge is the nearest d/s classified stream
A1 Excellent
For DMRB also known as RE1

According to Figure A.2 in DRMB 216/06 Dilution Factor has to be greater than:

Network	AADT	Dilution Factor
A	4100	4.9
B	3200	4.2
C	6700	5.6

DRMB METHOD B - Detailed Assessment

EQS for RE1 (A) classed water course

Dissolved Copper	22	µg/L
Total Zinc	200	µg/L

Q95 Value	Network	Downstream River concentration (µg/L)	
		Dissolved Copper	Zinc
0.00065	A (Drainage Area 2)	16.90	31.48
0.00041	B (Drainage Area 6)	19.44	37.36

All Within EQS Limits therefore its PASS and no need for additional pollution measures

Job no: P0000346600
Job name: A82 Crianlarich Bypass

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc by: Z Reville Calc Date: 12/05/2009

Watercourse: Drainage Area 2 (Network A) NGR 238434, 725043
Associated pond: South Detention Basin

1. 95%ile river flow (Q_{95})	0.0007	m^3/sec	Crianlarich catchment drainage_v2.xls
2. Road width		m	
3. Road length		m	
4. AADT	4100	veh/day	Traffic flow_Dec08.pdf
5. Runoff coefficient	0.75		Windes MicroDrainage program
6. Rainfall depth	0.015	m	HA 216/06 Figure A.1 p.AI/2

Road Area 3956.54 **m^2** Catchment Areas 17.12.07.xls

Runoff volume from highway, V_H 44.51 **m^3**

River flow daily volume, V_R 56.29 **m^3**

Dilution, D 1.26

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.
Unless stated otherwise, references relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Checked by: **Jason Ball**
Date: **14th May 2009**

Job no: P0000346600
Job name: A82 Crianlarich Bypass

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc by: Z Reville Calc Date: 12/05/2009

Watercourse: Drainage Area 6 (Network B) NGR 238047, 725576
Associated pond: North Detention Basin

1. 95%ile river flow (Q_{95})	0.0004	m^3/sec	Crianlarich catchment drainage_v2.xls
2. Road width		m	
3. Road length		m	
4. AADT	3200	veh/day	Traffic flow_Dec08.pdf
5. Runoff coefficient	0.75		Windes MicroDrainage program
6. Rainfall depth	0.015	m	HA 216/06 Figure A.1 p.AI/2

Road Area 5445.32 **m^2** Catchment Areas 17.12.07.xls

Runoff volume from highway, V_H 61.26 **m^3**

River flow daily volume, V_R 35.61 **m^3**

Dilution, D 0.58

From Figure A.2 it can be seen that detailed assessment is required, as the dilution is not above the minimum requirement level for impacts from routine runoff.
Unless stated otherwise, references relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Checked by: **Jason Ball**
Date: **14th May 2009**

Job no: P0000346600
Job name: A82 Crianlarich Bypass

METHOD A: SIMPLE ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Calc by: Z Reville Calc Date: 12/05/2009

Watercourse: Drainage Area 8 (Network C) NGR 237930, 725654
Associated pond: Filter Trench

1. 95%ile river flow (Q_{95})	0.0014	m^3/sec	Crianlarich catchment drainage_v2.xls
2. Road width		m	
3. Road length		m	
4. AADT	6700	veh/day	Traffic flow_Dec08.pdf
5. Runoff coefficient	0.75		Windes MicroDrainage program
6. Rainfall depth	0.015	m	HA 216/06 Figure A.1 p.AI/2

Road Area	1374.94	**m^2**	Catchment Areas 17.12.07.xls
Runoff volume from highway, V_H	15.47	**m^3**	
River flow daily volume, V_R	119.40	**m^3**	
Dilution, D	7.72		

From Figure A.2 it can be seen that detailed assessment is not required, as the dilution is above the minimum requirement level for impacts from routine runoff.

Unless stated otherwise, references relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Checked by: **Jason Ball**
Date: **14th May 2009**

Job no: **P0000346600**
Job name: **A82 Crianlarich Bypass**

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse: Drainage Area 2 (Network A) NGR 238434, 725043
Associated pond: South Detention Basin
RE Classification: RE1

Calc by: **Z Reville** **Calc Date: 12/05/2009**

A detailed assessment of pollution impacts from routine runoff is required.

1. Drained Area	0.396	ha	Catchment Areas 17.12.07.xls
2. Hardness	25.000	mg/l	Inferred value from EQS
3. AADT	4100	veh/day	Traffic flow_Dec08.pdf
4. Permitted EQS for copper	22	µg/l	HA 216/06 Table 2.1
5. Permitted EQS for zinc *if RE 1 or RE 2*	200	µg/l	HA 216/06 Table 2.1
6. Permitted EQS for zinc *if RE 3 or RE 4*		µg/l	HA 216/06 Table 2.1
7. Built-up rate for soluble copper	0.200	kg/ha/yr	HA 216/06 Table B.1
8. Built-up rate for total zinc	0.400	kg/ha/yr	HA 216/06 Table B.1
9. Runoff volume from highway, V_H	44.51	m^3	Method A
10. River flow daily volume, V_R	56.29	m^3	Method A

Unless stated otherwise, references relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.0110 kg/m^3
Inferred data (half EQS value)

M (for copper) 0.0011 kg (5 day)

V_R+V_H 100.80 m^3

Downstream River Concentration for Copper C_R 16.90 µg/l PASS

Additional Pollution Control Measures ARE NOT needed

River Ecosystem Class RE 1

Upstream total zinc C_B (kg/m^3) 0.0179 kg/m^3
Actual Data

M (for zinc) 0.0022 kg (5 day)

Downstream River Concentration for Zinc C_R 31.48 µg/l PASS

Additional Pollution Control Measures ARE NOT needed

Checked By: **Jason Ball**
Date: **14th May 2009**

Job no: **P0000346600**
Job name: **A82 Crianlarich Bypass**

METHOD B: DETAILED ASSESSMENT OF POLLUTION IMPACTS FROM ROUTINE RUNOFF

Watercourse: Drainage area 6 (Network B) NGR 238047, 725576
Associated pond: North Detention Basin
RE Classification: RE1

Calc by: **Z Reville** **Calc Date: 21/05/2008**

A detailed assessment of pollution impacts from routine runoff is required.

1. Drained Area	0.545	ha	Catchment Areas 17.12.07.xls
2. Hardness	25.000	mg/l	Inferred value from EQS
3. AADT	3200	veh/day	Traffic flow_Dec08.pdf
4. Permitted EQS for copper	22	µg/l	HA 216/06 Table 2.1
5. Permitted EQS for zinc *if RE_1 or RE_2*	200	µg/l	HA 216/06 Table 2.1
6. Permitted EQS for zinc *if RE_3 or RE_4*		µg/l	HA 216/06 Table 2.1
7. Built-up rate for soluble copper	0.200	kg/ha/yr	HA 216/06 Table B.1
8. Built-up rate for total zinc	0.400	kg/ha/yr	HA 216/06 Table B.1
9. Runoff volume from highway, V_H	61.26	m^3	Method A
10. River flow daily volume, V_R	35.61	m^3	Method A

Unless stated otherwise, references relate to the report Road Drainage and the Water Environment HA 216/06. Volume11 Section 3 Part 10

Upstream dissolved copper C_B (kg/m^3) 0.0110 kg/m^3
Inferred data (half EQS value)

M (for copper) 0.0015 kg (5 day)

V_R+V_H 96.87 m^3

Downstream River Concentration for Copper C_R 19.44 µg/l PASS

Additional Pollution Control Measures ARE NOT needed

River Ecosystem Class RE_1

Upstream total zinc C_B (kg/m^3) 0.0179 kg/m^3
Actual Data

M (for zinc) 0.0030 kg (5 day)

Downstream River Concentration for Zinc C_R 37.36 µg/l PASS

Additional Pollution Control Measures ARE NOT needed

Checked By: **Jason Ball**
Date: **14th May 2009**