Appendix 13

Water Quality Prediction

Proposed Scheme.

Water Quality Prediction **Proposed Road Configuration** **29/11/2007**

		Leader Water	Headshaw Burn	
E.Q.S. Level - copper	mg/l	**3.0**	**3.0**	Data from S.E.P.A.
E.Q.S. Level - zinc	mg/l	**15.0**	**15.0**	Data from S.E.P.A.
Area of road (A)	ha	2.08	0.91	13m wide road *
Runoff Coefficient (R)		0.5	0.5	Section A.3.ii, Annex 1, Part 10, DMRB Vol. 11.
Rainfall Depth (D)	mm/d	13	13	Figure A.1, Annex 1, Part 10, DMRB Vol. 11.
Q_{95}	m^3/s	0.087	0.043	Data from S.E.P.A.
C_B - copper - upstream	kg/m^3	0.0015	0.0015	Based on Leader Water Data of same river quality
C_B - zinc - upstream	kg/m^3	0.0075	0.0075	Based on Leader Water Data of same river quality
Runoff Volume (V_H)	m^3/day	135.2	59.2	Runoff Volume=(A x R x D/1000) x10000
Q_{95} (V_R)	m^3/day	7516.8	3749.8	95 percentile flow m^3/day (Q95 x 3600seconds x 24hrs)
Dilution		**55.6**	**63.4**	(V_R / V_H) - Section A3 (iv), Annex 1, HA 216/06.
AADT	**veh/day**	**11748**	**11748**	From Stage 3 Traffic & Economic Assessment - Design Year (2025) Flows
Bulid up rate - Copper	kg/ha/yr	0.3	0.3	Table B.1, Annex 1, Part 10, DMRB Vol. 11.
Bulid up rate - Zinc	kg/ha/yr	1.0	1.0	Table B.1, Annex 1, Part 10, DMRB Vol. 11.
M_{cu}	kg/5day	0.0085	0.0037	Five day Pollutant build-up Copper
C_R - soluable copper	kg/m^3	0.0026	0.0025	CR = {(C_B x V_R)+(1000 x M)} / (V_R x V_H)
C_R - soluable copper	mg/l	**2.6**	**2.5**	Down stream river concentration of copper in micrograms per litre µg/l
M_{zn}	kg/5day	0.028	0.012	Five day Pollutant build-up Zinc
Cr - zinc	kg/m^3	0.0111	0.0107	CR = {(C_B x V_R)+(1000 x M)} / (V_R x V_H)
Cr - zinc	mg/l	**11.1**	**10.7**	Down stream river concentration of zinc in micrograms per litre µg/l

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*Area of road drained into Headshawn Burn = {(Ch1+45 to Ch2+50) x 11.75m wide road + (Ch2+50 to Ch7+35) x 13.5m wide road}/10,000m2
*Area of road drained into Leader Water = {(Ch7+35 to Ch18+30) x 13.5m wide road + (Ch18+30 to Ch21+55) x 12.75m}/10,000m2

New Side Road
*Area of road drained into Headshawn Burn = {(Ch700 to Ch1000) x 4m wide road}/10,000m2
*Area of road drained into Leader Water = {(Ch0 to Ch700) x 4m wide road}/10,000m2

Existing Scheme.

Water Quality Prediction **Existing Road Configuration** **29/11/2007**

		Leader Water	Headshaw Burn	
E.Q.S. Level - copper	mg/l	**3.0**	**3.0**	Data from S.E.P.A.
E.Q.S. Level - zinc	mg/l	**15.0**	**15.0**	Data from S.E.P.A.
Area of road * (A)	ha	1.06	0.54	13m wide road *
Runoff Coeficient (R)		0.5	0.5	Section A.3.ii, Annex 1, Part 10, DMRB Vol. 11.
Rainfall Depth (D)	mm	13	13	Figure A.1, Annex 1, Part 10, DMRB Vol. 11.
Q_{95}	m^3/s	0.087	0.043	Data from S.E.P.A.
C_B - copper - upstream	kg/m^3	0.0015	0.0015	Based on Leader Water Data of same river quality
C_B - zinc - upstream	kg/m^3	0.0075	0.0075	Based on Leader Water Data of same river quality
Runoff Volume	m^3/day	68.9	35.1	Runoff Volume=(A x R x D/1000) x10000
Q_{95}	m^3/day	7516.8	3749.76	95 percentile flow m^3/day (Q95 x 3600seconds x 24hrs)
Dilution		**109**	**107**	(V_R / V_H) - Section A3 (iv), Annex 1, HA 216/06.
AADT	**veh/day**	**11748**	**11748**	From Stage 3 Traffic & Economic Assessment - Design Year (2025) Flows
Build up rate - Copper	kg/ha/yr	0.3	0.3	Table B.1, Annex 1, Part 10, DMRB Vol. 11.
Build up rate - Zinc	kg/ha/yr	1.0	1.0	Table B.1, Annex 1, Part 10, DMRB Vol. 11.
M_{cu}	kg/5day	0.0044	0.0022	Five day Pollutant build-up Copper
C_R - soluable copper	kg/m^3	0.0021	0.0021	CR = {(C_B x V_R)+(1000 x M)} / (V_R x V_H)
C_R - soluable copper	mg/l	**2.1**	**2.1**	Down stream river concentration of copper in micrograms per litre µg/l
M_{zn}	kg/5day	0.015	0.007	Five day Pollutant build-up Zinc
Cr - zinc	kg/m^3	0.0093	0.0094	CR = {(C_B x V_R)+(1000 x M)} / (V_R x V_H)
Cr - zinc	mg/l	**9.3**	**9.4**	Down stream river concentration of zinc in micrograms per litre µg/l

*Area of road drained into Headshawn Burn = {(Ch1+45 to Ch5+50) x 10m wide road + (Ch5+50 to Ch7+35) x 7.3m}/10,000m2
*Area of road drained into Leader Water = {(Ch7+35 to Ch21+00) x 7.3m wide road + (Ch21+00 to Ch21+55) x 12m}/10,000m2