






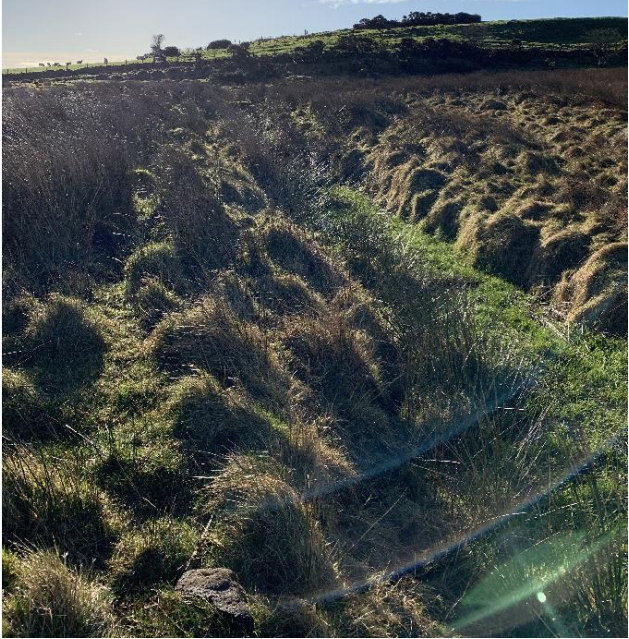

Appendix H



Watercourse Crossing Schedule



REF	DESCRIPTION	Easting	Northing	
SIGNIFICANT WATERCOURSE CROSSINGS				
WX03	<p>NEW 1.1 M (H) X 3M (SPAN) BOTTOMLESS CULVERT OR SPRUNG ARCH EQUIVALENT. SOFFIT LEVEL MIN 195m OD.</p> <p>PLUS 2 NO. 0.9M DIA FLOODPLAIN CULVERTS</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>CHANNEL MORPHOLOGY AND FLUVIAL PROCESSES CHARACTERISED BY POOS / RIFFLES WITH LARGE BOULDERS, COBBLES AND SOME BEDROCK.</p> <p>FISHERIES INTEREST WITH REGARDS TO GOOD NURSERY GROUND AND RESTING POOLS.</p> <p>CLEAR SPAN CROSSING PROPOSED TO COMPLY WITH ENVIRONMENTAL STATEMENT MITIGATION.</p>	325960	414623	
WX3.1	<p>NEW 1.3M (H) X 3M (SPAN) BOTTOMLESS CULVERT OR SPRUNG ARCH EQUIVALENT. SOFFIT LEVEL MIN 196.3m OD.</p> <p>PLUS 2 NO. 0.75M DIA FLOODPLAIN CULVERTS</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>CHANNEL MORPHOLOGY AND FLUVIAL PROCESSES CHARACTERISED BY MAINLY COBBLES AND BOULDER BED WITH HIGH COVERAGE OF AQUATIC MOSSES.</p> <p>FISHERIES INTEREST WITH REGARDS TO GOOD NURSEY GROUND AND RESTING POOLS.</p> <p>CLEAR SPAN CROSSING PROPOSED TO COMPLY WITH ENVIRONMENTAL STATEMENT MITIGATION.</p>	326027	414746	



REF	DESCRIPTION	Easting	Northing	
SIGNIFICANT WATERCOURSE CROSSINGS				
WX09	<p>NEW 1.8M (H) X 3M (SPAN) BOTTOMLESS CULVERT OR SPRUNG ARCH EQUIVALENT. SOFFIT MIN. 203.4 m OD.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>CHANNEL MORPHOLOGY AND FLUVIAL PROCESSES CHARACTERISED BY RIFFLES, RUNS AND DEEP POOLS WITH COBBLES AND BOULDER BED.</p> <p>FISHERIES INTEREST WITH REGARDS TO GOOD NURSEY GROUND AND RESTING POOLS.</p> <p>CLEAR SPAN CROSSING PROPOSED TO COMPLY WITH ENVIRONMENTAL STATEMENT MITIGATION.</p>	325464	414705	
WX14	<p>NEW 1.2M (H) X 2.5 (SPAN) BOTTOMLESS CULVERT OR SPRUNG ARCH EQUIVALENT SOFFIT MIN. 210.4 m OD.</p> <p>PLUS 2 NO. 0.9M DIA FLOODPLAIN CULVERTS</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>CHANNEL MORPHOLOGY AND FLUVIAL PROCESSES CHARACTERISED BY BEDROCK, COBBLE AND SHINGLE/FINES.</p> <p>FISHERIES INTEREST WITH REGARDS TO GOOD NURSEY GROUND AND RESTING POOLS.</p> <p>CLEAR SPAN CROSSING PROPOSED TO COMPLY WITH ENVIRONMENTAL STATEMENT MITIGATION.</p>	325026	413773	



REF	DESCRIPTION	Easting	Northing	
SIGNIFICANT WATERCOURSE CROSSINGS				
WX18	<p>NEW 1.1 M (H) X 2.8 (SPAN) BOTTOMLESS CULVERT OR SPRUNG ARCH EQUIVALENT. SOFFIT MIN. 201 m OD.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>CHANNEL MORPHOLOGY AND FLUVIAL PROCESSES CHARACTERISED RIFFLESA, RUNS AND OCCASIONAL DEEP POOLS, WITH BED OF BOULDER, COBBLE, PEBBLE, WITH EXTENSIVE AQUATIC MOSSES.</p> <p>FISHERIES INTEREST WITH REGARDS TO GOOD NURSEY GROUND AND RESTING POOLS.</p> <p>CLEAR SPAN CROSSING PROPOSED TO COMPLY WITH ENVIRONMENTAL STATEMENT MITIGATION.</p>	324924	413272	
WX19	<p>NEW 1.4 M W BOX CULVERT</p> <p>PLUS 2 NO. 0.75M DIA FLOODPLAIN CULVERTS</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>FISHERIES ASSESSMENT INDICATES MULTIPLE MORPHOLOGICAL BARRIERS PREVENTING FISH PASSAGE, NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	325010	415459	



REF	DESCRIPTION	Easting	Northing	
MINOR WATERCOURSE CROSSINGS				
WX01	<p>NEW MIN 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT), SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>TO BE DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGETATED CHANNEL EPHEMERAL / VERY LOW FLOW AT TIME OF SURVEY, NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	326577	414106	
WX02	<p>NEW MIN 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT), SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>TO BE DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGETATED CHANNEL, NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	326471	414118	


REF	DESCRIPTION	Easting	Northing	
MINOR WATERCOURSE CROSSINGS				
WX04	<p>NEW MIN 0.9 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT), SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>TO BE DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>ROCKY MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	326096	415647	
WX05	<p>NEW MIN. 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>TO BE DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGETATED CHANNEL, NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	326282	415596	

REF	DESCRIPTION	Easting	Northing	
MINOR WATERCOURSE CROSSINGS				
WX06	<p>REPLACEMENT MIN. 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) TO REPLACE EX. 0.3M PIPE. SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>TO BE DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGETATED CHANNEL, NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	326434	416219	
WX08	<p>NEW MIN. 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>ROCKY MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	325787	416208	

REF	DESCRIPTION	Easting	Northing	
MINOR WATERCOURSE CROSSINGS				
WX10	<p>NEW MIN. 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGETATED CHANNEL, NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p> <p>VEGTATED MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	325157	415241	
WX11	<p>NEW MIN. 0.9 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>ROCKY MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	324660	415549	

REF	DESCRIPTION	Easting	Northing		
MINOR WATERCOURSE CROSSINGS					
WX12	<p>NEW MIN. 0.75 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>ROCKY / VEGTATED MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	324893	415514		
WX13	<p>NEW MIN. 0.9 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGTATED MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	325022	414281		

REF	DESCRIPTION	Easting	Northing	
MINOR WATERCOURSE CROSSINGS				
WX15	<p>NEW MIN. 0.9 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>ROCKY / VEGTATED MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	324794	413431	
WX16	<p>NEW MIN. 0.9 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGTATED MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	324719	413228	

REF	DESCRIPTION	Easting	Northing	
MINOR WATERCOURSE CROSSINGS				
WX17	<p>NEW MIN. 0.9 M DIA CIRCULAR (CLASS 120 CONCRETE OR EQUIVALENT) SUBJECT TO DESIGN POST PLANNING APPROVAL.</p> <p>CATCHMENT MAP INCLUDED IN ANNEX B</p> <p>DESIGNED FOR FREE INLET CONDITIONS 1% AEP + CLIMATE CHANGE</p> <p>VEGTATED MORPHOLOGY, FISHERIES ASSESSMENT CONFIRMS NO FISHERIES INTEREST - CLOSED CULVERT ACCEPTABLE</p>	324708	413151	



Calculation Record - Flood Hydrology

Purpose

To estimate design floods at culvert locations. Culvert catchments are insufficient to be represented in FEH dataset. Approach adopts estimation of discharge at closest downstream point in FEH dataset by REFH2.3 methodology. REFH flow scaled pro-rata by area to respective culvert catchments.

Donor Catchment (Northern Section of Site)

Hydrological estimation point	327000 414700		
Catchment Area	5.79	sq km	from FEH dataset
1% AEP Present Day (cumecs)	14.7	from REFH2.3	refer to separate REFH calculation output
1% AEP Climate Change (cumecs)	17.64		

Specific Discharge 2.54 cumecs/Sq.km

Donor Catchment (Southern Section of Site*)

Hydrological estimation point	324200 412200		
Catchment Area	3.18	sq km	from FEH dataset
1% AEP Present Day (cumecs)	7.1	from REFH2.3	refer to separate REFH calculation output
1% AEP Climate Change (cumecs)	8.52		

Specific Discharge 2.23 cumecs/Sq.km

Culvert Catchment / Flow Estimation

Culvert ID	Area Sq KM	1% AEP Present Day (cumecs)	1% AEP Climate Change (cumecs)
WX03	4.13	10.50	12.59
WX3.1	1.15	2.91	3.49
WX09	2.56	6.50	7.80
WX14*	0.59	1.31	1.57
WX18*	1.28	2.85	3.42
WX19	0.91	2.30	2.76
WX01	0.06	0.15	0.18
WX02	0.27	0.69	0.82
WX04	0.18	0.46	0.55
WX05	0.08	0.20	0.24
WX06	0.11	0.28	0.34
WX08	0.20	0.51	0.61
WX10	0.02	0.05	0.06
WX11	0.15	0.38	0.46
WX12	0.31	0.79	0.94
WX13	0.47	1.19	1.43
WX15*	0.13	0.29	0.35
WX16*	0.11	0.25	0.29
WX17*	0.02	0.04	0.05

ANNEX B - CATCHMENT MAPS

