Appendix D. Calculations for Balland Stream Flood Risk Mitigation to Ashburton

70282

3.22

322

From DHS

2.230

3.040

3.610

4.440

5.160

5.960

7.152

7.220

8.310

9.590

indicates flood occurs at

Love Lane for 1 in 10yr,

that flow rate is

highlighted yellow

As Chuley Road SFRA

174.931

1.236

1.684

2.000

2.460

2.859

3.302

3.963

4.001

4.605

5.314

So an extreme event

could cause flooding due

to downstream

catchment alone

Northing

Peak river flows QMED / Q2 km2

ha

m3/s

Area

5yr

10yr

25yr

50yr

100yr

250yr

500yr

1000yr

100yr+20%

Natural situation as per Devon Hydrology Study and no intercept by quarry

BS1 constant, but Q2 will

increase as quarry

expands

Catchment:		Balland Stream total catchment to Devon Hydrology Study Node 3532	Measured sub catchment: downstream of side weir overflow point to quarry Balland Pit	Measured sub catchment: upstream of side weir overflow to point quarry Balland Pit	Sub catchment: quarry extraction area to FEH catchment extent for Balland Stream	Sub catchments totalled	Measured sub catchment: downstream of side weir overflow point to quarry Balland Pit	Measured sub catchment: upstream of side weir overflow to point quarry Balland Pit	Measured sub catchment: quarry extraction area with 24 hr average pumped discharge rate	Balland Stream total catchment to Devon Hydrology Study Node 3532	Reduction in flow rate in Balland Stream at Node 3532
Catchment ID		N3532	BS2	BS1	Q1	BS2+BS1+Q1	BS2	BS1	Q2	BS2+BS1+Q2	
Easting		276245									
Northing		70282									
Area	km2	3.22									
	ha	322	174.931	101.826	38.950	315.707	174.931	101.826	51.781	328.538	
Peak river flows		From DHS	From DHS by area proportion to river flows at Node 3532 Checksum							Q1 minus Q2	
QMED / Q2	m3/s	2.230	1.236	0.719	0.275	2.230	1.236	0.719	0.115	2.070	0.160
5yr	m3/s	3.040	1.684	0.981	0.375	3.040	1.684	0.981	0.115	2.780	0.260
10yr	m3/s	3.610	2.000	1.164	0.445	3.610	2.000	1.164	0.115	3.280	0.330
25yr	m3/s	4.440	2.460	1.432	0.548	4.440	2.460	1.432	0.115	4.007	0.433
50yr	m3/s	5.160	2.859	1.664	0.637	5.160	2.859	1.664	0.115	4.638	0.522
100yr	m3/s	5.960	3.302	1.922	0.735	5.960	3.302	1.922	0.115	5.340	0.620
100yr+20%	m3/s	7.152	3.963	2.307	0.882	7.152	3.963	2.307	0.115	6.385	0.767
250yr	m3/s	7.220	4.001	2.329	0.891	7.220	4.001	2.329	0.115	6.444	0.776
500yr	m3/s	8.310	4.605	2.680	1.025	8.310	4.605	2.680	0.115	7.400	0.910
1000yr	m3/s	9.590	5.314	3.093	1.183	9.590	5.314	3.093	0.115	8.522	1.068
									Quarry discharge limit is 10,000m3/day	Attenuation from 1 in 10yr to about 1 in 15yr	Reduction increases by 0.115m3/s if quarry not pumping to discharge point
		Scope for future attenua	ation								
Catchment:		Balland Stream total catchment to Devon Hydrology Study Node 3532	of side weir overflow	Sub-catchment for which flows can be attenuated at the quarry			Balland Str	eam total catchment to De	evon Hydrology Study Nod	e 3532, predictions of att	enuated flow
Catchment ID		N3532	BS2	BS1+Q2					BS2+BS1+Q2		
Easting		276245							276245		
N.L. and Jackson		70202							70202		

F1 = restricted flow

from BS1+Q2, m3/s:

Effect of restricted flow

1.150

F1 + BS2

2.385

2.834

3.150

3.610

4.009

4.452

5.113

5.150

5.754

6.464

1 in 25yr

1.044

F1 + BS2

2.280

2.728

3.044

3.504

3.903

4.346

5.007

5.045

5.649

6.358

1 in 30yr

Existing situation with intercept by quarry extraction area ony (i.e. no flow to quarry via side weir)

70282

0.751

F1 + BS2

1.987

2.435

2.751

3.211

3.610

4.053

4.714

4.751

5.355

6.065

1 in 10yr attenuated to 1 in 10yr attenuated to 1 in 10yr attenuated to 1 in 10yr attenuated to

1 in 50yr

0.308

F1 + BS2

1.543

1.992

2.308

2.768

3.167

3.610

4.270

4.308

4.912

5.621

1 in 100yr

0.000

F1 + BS2

1.236

1.684

2.000

2.460

2.859

3.302

3.963

4.001

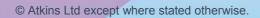
4.605

5.314

1 about in 150yr

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