Appendix 11.4

Hydromorphology Assessment Part 3



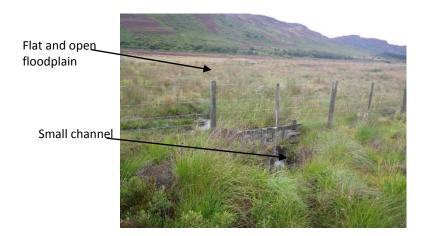
| Catchment No. Catchment Name | 117 | | | | |
|---|--|--|---|--|--|
| Catchinent Hame | | <u></u> | | | |
| Channel Nature | Nature of water course | | Drain | | |
| Cildiller Nature | Size of water course | | Other | | |
| | | T | | | |
| Quantitative Spatial | Catchment Area (km ²) Average slope in catchment (°) | | No Data No Data | | |
| Elements | % Catchment over 750m (for snow melt risk) | | 0 | | |
| | | | | | |
| | Water, flows and levels | | Good | | |
| Catchment Name Channel Nature Quantitative Spatial Elements WFD classification Geology Environmental designations (see Drawing 11.4.3.1 c, Catchment 117) Sediment source and supply - Catchment Scale Morphology and Processs Reach upstream of crossing | Physical condition Overall ecological status | | Good Moderate | | |
| | Overall ecological status | | Modelate | | |
| | Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 117) | Gaick Psammite formation-Psammite | resistant to weathering, impermeable | | |
| Geology | Is an alluvial fan present at or near the crossing? | No | | | |
| | | | | | |
| | Ramsar | No | | | |
| | SAC SPA | No | | | |
| | SSSI | NO | | | |
| | | | | | |
| | Changes in slope and channel confinement | | 11.4.3.2, Catchment 117 | | |
| | Is peat present in the catchment Is there a bog burst risk | No | | | |
| | Current valley side or terrace erosion | No | | | |
| | Potential valley side or terrace erosion | No | | | |
| Sediment source and | Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel | No | | | |
| | | No | | | |
| | Bank erosion/lateral migration | No | | | |
| | Unvegetated bars | No No | | | |
| | Wooded/forested areas in catchment Infrastructure type (see Drawing 11.4.3.1 d, Catchment 117) | No | | | |
| | Comment on sediment source potential in catchment | | Limited | | |
| | Comment on sediment supply potential to crossing | | Limited | | |
| r | Channel morphology | Plane bed | | | |
| | Predominant sediment size | Fines and some cobbles | | | |
| | Unvegetated bars | No | | | |
| Morphology and Process- | Vertical incision | Low | Incision of drain possible led to failure of drain banks but now seem stabilised | | |
| | Deposition | None | | | |
| | Lateral migration/bank erosion | Low | Previous failure of drain banks evident due to | | |
| | Presence and nature of infrastructure (Map 1d) | None | incision but now stabilised | | |
| ĺ | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 117) | | | | |
| Ĺ | Channel realignment | Drain has captured hillslope drainage | | | |
| | | | | | |
| | Channel morphology | Engineered | | | |
| | Predominant sediment size | Large gravel with fine drape u/s of | | | |
| | Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars | 1.4 No | | | |
| Morphology and Process- | Vertical incision | None | | | |
| At crossing | Deposition | Low | Small culvert exit appears choked with sediment | | |
| ĺ | Lateral migration/bank erosion | None | | | |
| | Damaged/unstable drains or armouring | None | | | |
| · | | | | | |
| | Channel morphology Prodominant codiment cite | Plane bed fine | | | |
| | Predominant sediment size Unvegetated bars | No | | | |
| Morphology and Process- | Vertical incision | None | | | |
| | Deposition | None | | | |
| crossing | Lateral migration/bank erosion Presence and nature of infrastructure (Map 1d) | None Yes | Railway | | |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 117) | Railway | Channel realigned to join others to pass under | | |
| ĺ | | | railway at one single point. | | |
| l | Channel realignment | Yes | See above | | |
| Summary behaviour | Very little happening . Cut drains u/s of crossing have previously inc stabilised. Small amounts of large gravel are deposited u/s of the culv D/s of the small culvert has become choked with fine sediment, whic | vert where the drains drop to below road I | evel, but the armouring here seems mostly intact. | | |
| | | | | | |

| Damaged/unstable drains or armouring Yes D/s of culvert substantial scour appears occurred at end of concrete apron, under the apron. Morphology and Process- Reach downstream of Channel morphology Plane bed Vertical incision Large gravel Vertical incision Medium Scour after concrete apron Deposition Low | Catchment No. | 118 | | | | | |
|--|--|--|--|---|--|--|--|
| Channel Nature Size of water course Minor Quantitative Spatial Benerits Coldmant Action Structure Course Scatchment Coldmant December 2006 (for snow melt risk) No Data WD classification Marce Town Structure Mysical condition Good WD classification Moderate Mysical condition Good Bajerity Bedrock (see Drawing 11.4.3.1 a di b Cathment 1131) is an allowing for snow need roles Socie No Sector Structure Moderate Environmental designations (see Socie Socie No Socie Drawing 11.4.3.1 c, cathment 1131 Socie No Socie Sediment 2005 Socie No Socie Drawing 11.4.3.1 c, cathment 1131 Socie No Socie Sediment source and work value value of transc conting No Socie No Sediment source and work value value of transc conting No Socie No Sediment source and work value value of transc conting No Socie No Sediment source and work value value of contained No Socie No Socie Sediment source and work value of transc contained debris flows and sldes) No | Catchment Name | - | | | | | |
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| Elements No Data WFD classification Mode and American Source and American American American American American American American Ameri | Quantitative Spatial | Catchment Area (km ²) | | | | | |
| WPD classification Water, flows and levels Good WPD classification Good Good Overall ecological status Moderse Good Geology Is an alloval fan present at or near the crossing? No Issection designation (spee) Size No Issection No designation (spee) Size No Issection No designation (spee) Size No Issection No station (spee) Size No Issection No station (spee) Size No Issection No Issection station (spee) Size (size) No Issection No Issection Issection Issection No Issection Iss | · · | | | | | | |
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| WPD classification Order Order Overall ecological status Moderate Moderate Geology Majority Edectock (see Drawing 11.4.3.1 and b Catchment 118) Galck Rammite formation-Rammite resistant to weathering, ingermeable designation (see Drawing 11.4.3.1 c, SPA SPA No No designation (see Drawing 11.4.3.1 c, SPA SPA No No designation (see Drawing 11.4.3.1 c, SPA SPA No No designation (see Drawing 11.4.3.2, Catchment 118) See Drawing 11.4.3.7, Catchment 118 See Drawing 11.4.3.7, Catchment 118 is there a log but risk Cornert valley also ar thrace contain (in this dope failures couple dick and debts flows and slides) No Intell dope failures couple dick and debts flows and slides) Hill dope failures couple dick and debts flows and slides) No Intelled amount See couple dick and debts flows and slides) Hill dope failures couple dick and debts flows and slides) No Intelled amount No Statement source and Worded/forested areas in act/ment Vers Unified amount No No Morphology and Process- Reck upstream Comment on sediment supply potential to crossing Versid incoversing No | | | | | | | |
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| Comment on sediment supply potential to crossing u/s of culvert. Morphology and Process- Reach upstream of crossing Channel morphology Engineered Morphology and Process- Reach downstream of Reach downstream of Reach downstream of Reach downstream of Reach downstream of Reach downstream of Channel morphology Engineered Morphology and Process- Reach downstream of Reach downstream of Reach downstream of Channel morphology None Morphology and Process- Reach downstream of Channel morphology Engineered Morphology and Process- Reach downstream of Channel morphology Infrastructure (ma ² /s) 1.4 Morphology and Process- Reach downstream of Channel morphology None Morphology and Process- Reach downstream of Channel morphology None | | comment on sediment source potential in catchment | | | | | |
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| Morphology and Process. Predominant sediment size - Reach upstream of crossing Deposition None - Deposition None - - Lateral migration/bank erosion None - - Infrastructure type (see Drawing 11.4.3.1 d, Catchment 118) No - - Channel realignment Yes Natural channel incorporated into drain Morphology and Process. Channel morphology Engineered - Unvegetated bars Gravel - - Unvegetated bars No - - Vertical incision No - - Morphology and Process. Deposition Low - At crossing Channel morphology Engineered - Junvegetated bars No - - Vertical incision None - - Lateral migration/bank erosion None - - Jamaged/unstable drains or armouring Yes D/s of culvert engineered drains seems i D/s of culvert substantial scour appea | | Channel morphology | Engineered | | | | |
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| Reach upstream of crossing Deposition None Lateral migration/bank erosion None None Presence and nature of infrastructure (Map 1d) No No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 118) No Natural channel incorporated into drain Channel realignment Yes Natural channel incorporated into drain Morphology and Process- A t crossing Channel morphology Engineered Damaged/unstable drains or armouring Yes U/s of culvert engineered drains seems i D/s of culvert substatial scour appears occurred at end of concrete apron, unde the apron. Morphology and Process- Reach downstream of Reach downstream of Channel morphology U/s of culvert engineered drains seems i D/s of culvert substatial scour appears occurred at end of concrete apron, unde the apron. | | Unvegetated bars | No | | | | |
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| Channel realignment Yes Natural channel incorporated into drain Image: Channel morphology Engineered Engineered Predominant sediment size Gravel Engineered Estimated discharge at 1:200 event (m³/s) 1.4 Image: Channel morphology Unvegetated bars No Image: Channel morphology Image: Channel morphology At crossing Deposition Low Image: Channel morphology Image: Channel morphology Damaged/unstable drains or armouring Yes U/s of culvert engineered drains seems i D/s of culvert substantial scour appears occurred at end of concrete apron, unde the apron. Morphology and Process- Reach downstream of Channel morphology Plane bed Morphology and Process- Reach downstream of Channel morphology Plane bed | | | | | | | |
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| Predominant sediment size Gravel Estimated discharge at 1:200 event (m³/s) 1.4 Unvegetated bars No Vertical incision None Deposition Low Lateral migration/bank erosion Ves Damaged/unstable drains or armouring Yes Vestical incision Vestor Damaged/unstable drains or armouring Yes Vestor Unvegetated bars Vestor U/s of culvert engineered drains seems i D/s of culvert substantial scour appears occurred at end of concrete apron, unde the apron. Morphology and Process- Reach downstream of Reach downstream of Plane bed | L | Channel realignment | Yes | Natural channel incorporated into drain | | | |
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| Morphology and Process- At crossing Estimated discharge at 1:200 event (m ³ /s) 1.4 Morphology and Process- At crossing No Image: Comparison of the process of the p | | | | | | | |
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| At crossing Lateral migration/bank erosion None Damaged/unstable drains or armouring Yes U/s of culvert engineered drains seems i D/s of culvert substantial scour appears occurred at end of concrete apron, under the apron. Morphology and Process- Reach downstream of Channel morphology Plane bed Vertical incision Yes Incipient Vertical incision Medium Scour after concrete apron Deposition Low Low | | | None | | | | |
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| Damaged/unstable drains or armouring Yes D/s of culvert substantial scour appears occurred at end of concrete apron, under the apron. Morphology and Process Reach downstream of Lateral migration/bank erosion Channel morphology Plane bed Plane bed Vertical incision Yes Incipient Vertical incision Medium Scour after concrete apron Deposition Low Incipient | At crossing | Lateral migration/bank erosion | None | | | | |
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| Predominant sediment size Large gravel Unvegetated bars Yes Vertical incision Medium Deposition Low Interpretation Low | | | | the apron. | | | |
| Predominant sediment size Large gravel Unvegetated bars Yes Incipient Vertical incision Vertical incision Medium Deposition Low Itateral mieration/bank erosion Iow | | <u></u> | 1 | 1 | | | |
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| Morphology and Process Vertical incision Medium Scour after concrete apron Reach downstream of Lateral migration/bank erosion Low Interview Interview | | Predominant sediment size | Large gravel | | | | |
| Morphology and Process- Reach downstream of Lateral migration/bank erosion | | | | | | | |
| Reach downstream of Letzer lanieration/hank erosion Low Low | Morphology and Process- | | | Scour after concrete apron | | | |
| | | | | | | | |
| | crossing | Lateral migration/bank erosion | Low | Dellusu | | | |
| Presence and nature of infrastructure (Map 1d) Yes Railway Chapter to pass | - | | Tes | Railway Channel realigned to join others to pass under | | | |
| Infrastructure type (see Drawing 11.4.3.1 d, Catchment 118) Railway railway at one single point. | | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 118) | Railway | | | | |
| Channel realignment Yes See above | | Channel realignment | Yes | | | | |
| Channel steep but stable u/s of culvert with engineered sections near culvert intact and gravel seems to be delivered from natural bed activities further of deposited where gradient drops at culvert entrance. D/s of culvert exit is a concrete apron. At the end of this concrete apron the channel has scoured babegun to undermine the apron, so there are opportunities for improvement here. | Summary behaviour | deposited where gradient drops at culvert entrance. D/s of culvert e | exit is a concrete apron. At the end of this c | oncrete apron the channel has scoured back and | | | |

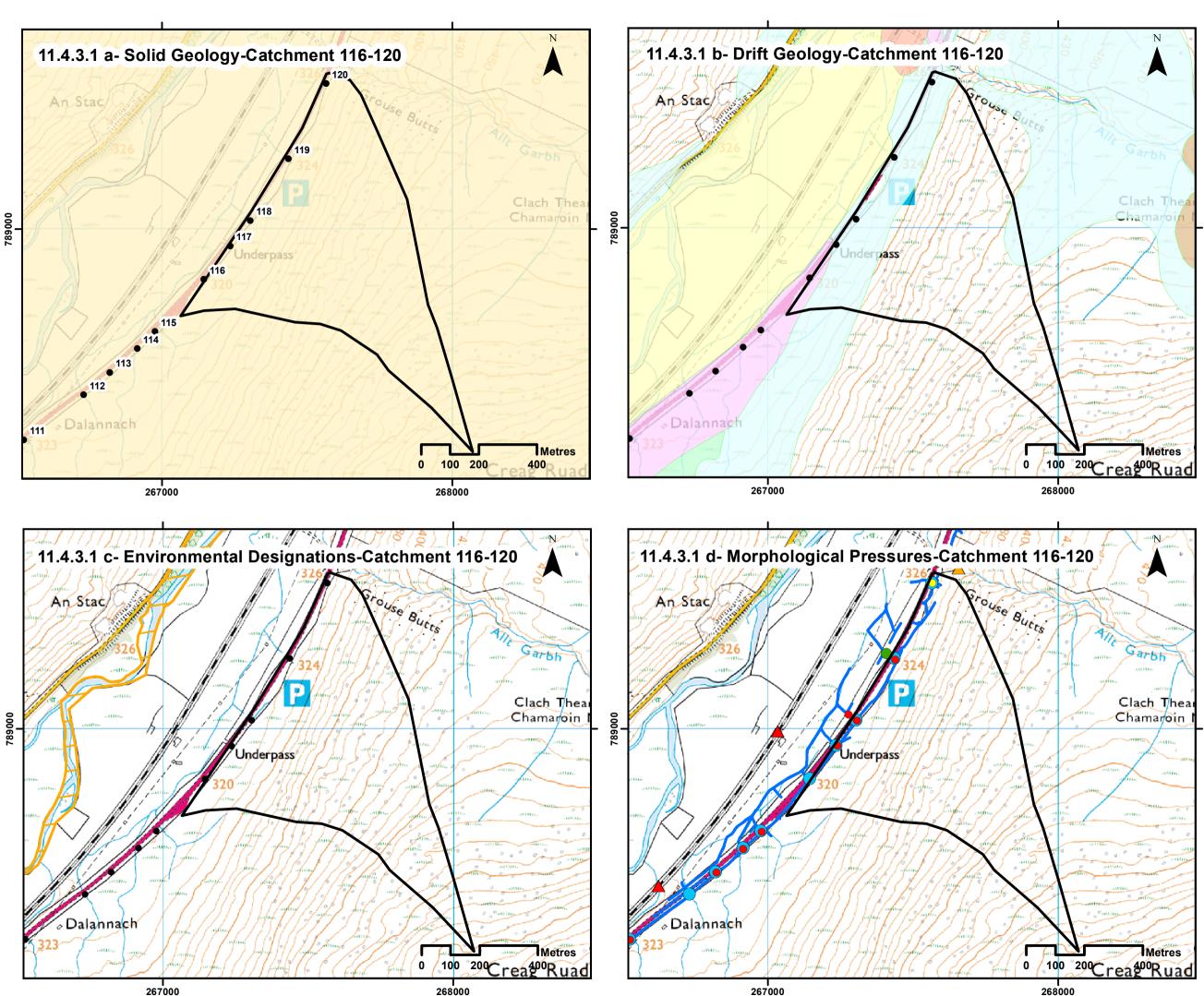
Catchment No. 119 Catchment Name Nature of water course Natural Channel Nature Size of water course Minor No Data Catchment Area (km²) Quantitative Spatial No Data Average slope in catchment (°) Elements % Catchment over 750m (for snow melt risk) No Data Water, flows and levels Good WFD classification Physical condition Good Overall ecological status Moderate Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 119) Gaick Psammite formation-Psammite resistant to weathering, impermeable Geology Is an alluvial fan present at or near the crossing? No Environmental Ramsar No designations (see SAC No Drawing 11.4.3.1 c, ΡA No SSSI No Catchment 119) Changes in slope and channel confinement See Drawing 11.4.3.2, Catchment 119 Is peat present in the catchment No Is there a bog burst risk No No Current valley side or terrace erosion No Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) No Sediment source and Hill slope failures coupled to channel No supply - Catchment Scal /ertical incision present in catchment No Bank erosion/lateral migration No No Unvegetated bars Wooded/forested areas in catchment No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 119) No Comment on sediment source potential in catchment Limited Comment on sediment supply potential to crossing No evidence of sediment delivery to culvert Channel morphology Engineered Predominant sediment size No Jnvegetated bars Morphology and Process None /ertical incision Reach upstream of Deposition None crossing ateral migration/bank erosion None Presence and nature of infrastructure (Map 1d) No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 119) No Channel realignment No Engineered Channel morphology Predominant sediment siz Estimated discharge at 1:200 event (m³/s) 1.4 Unvegetated bars No Morphology and Process Vertical incision None At crossing Deposition None Lateral migration/bank erosion None Limited amount of damage to cascade - blocks Damaged/unstable drains or armouring Yes loosened and possible scour at base (but difficult to see) Channel morphology Plane bed Predominant sediment size fine No Unvegetated bars /ertical incision Low Morphology and Process None Deposition Reach downstream of Lateral migration/bank erosion None crossing Presence and nature of infrastructure (Map 1d) None Channel realigned to join others to pass under nfrastructure type (see Drawing 11.4.3.1 d, Catchment 119) Railway railway at one single point Yes Channel realignment See above Little happening at this crossing, except that there may be opportunities to improve the substantial 2m drop u/s of the culvert and there is limited damage to the Summary behaviour cascade d/s of the culvert and possible scour at its base. Relatively low priority.



Photograph 11.4.3.106- Upstream to cascade

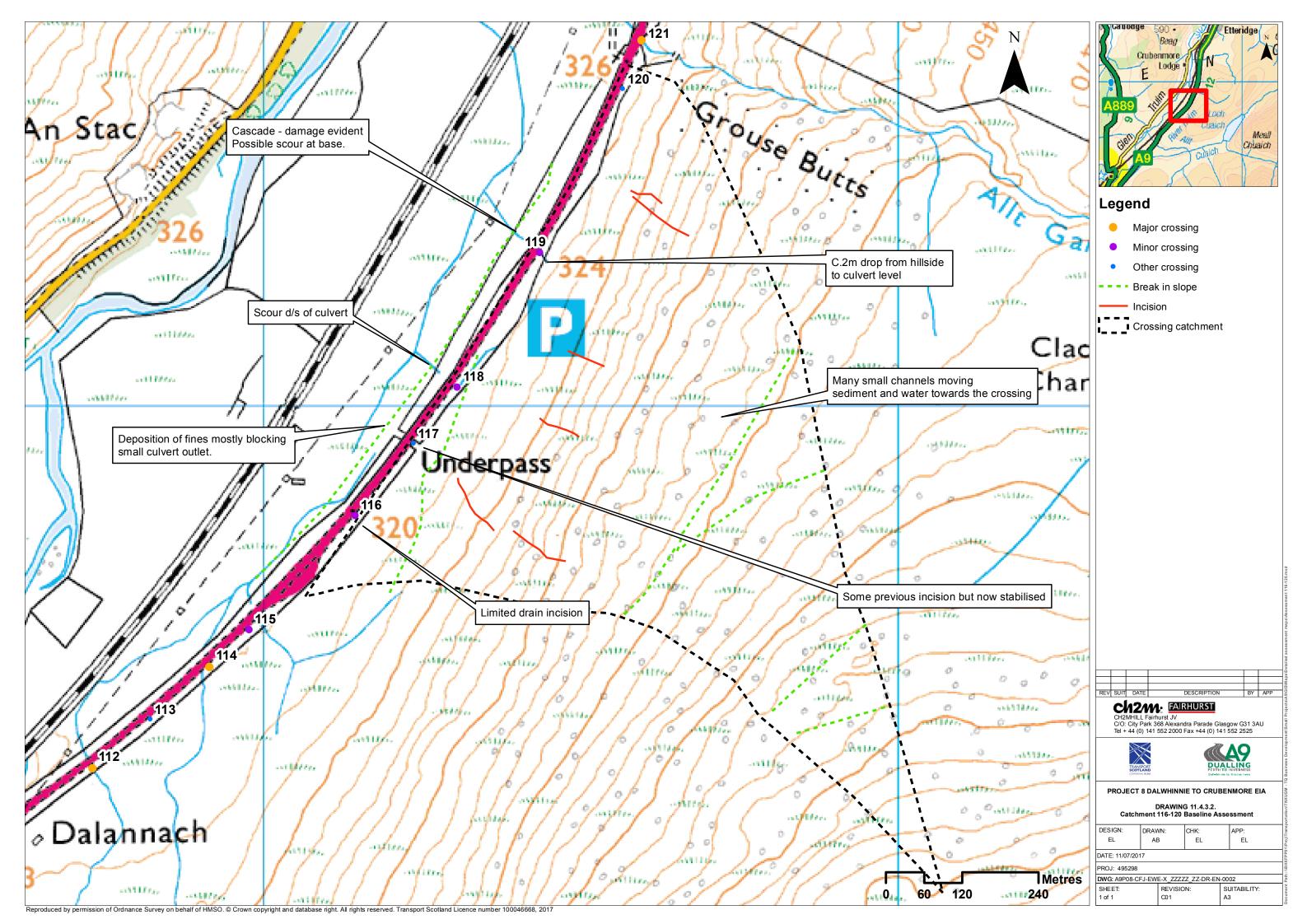


Photograph 11.4.3.107-Downstream



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| Legend | |
|---|---|
| General | |
| Crossing Location Catchment Area | |
| Solid Geology | |
| Gaick Psammite Formation - Psammite | |
| Drift Geology | |
| Peat Glaciofluvial Ice Contact Deposits | |
| Gaick Plateau Moraine Formation | |
| Hummocky Glacial Deposits | |
| Ardverikie Till Formation - Diamicton Glaciofluvial Sheet Deposits | |
| Alluvium | |
| River Terrace Deposits | |
| Alluvial Fan Deposits | |
| Talus - Rock Fragments | |
| Talus Cone | |
| Environmental Designations | |
| Special Area of Conservation Railway Bridge | |
| Road Bridge | |
| A Track/Footbridge | |
| Culvert | |
| Step in Bed | |
| Catchpit | |
| Drainage Ditch | |
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| REV SUIT DATE DESCRIPTION BY APP | |
| CH2MHILL Fairburst JV | |
| C/O: City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 | |
| ΩΔ.) | |
| TAANSPORT SCORLOUM ALMA CORLOUM ALMA Darbinice to Creatementer | |
| PROJECT 8 DALWHINNIE TO CRUBENMORE EIA | |
| Drawing 11.4.3.1 Catchment116- 120 Catchment Overview | |
| DESIGN: DRAWN: CHK: APP: EL EV EL EL | |
| DATE: 12/07/2017 | |
| PROJ: 495298 DWG: A9P08-CFJ-EWE-X_ZZZZZ_ZZ-DR-EN-0001 | |
| SHEET: REVISION: SUITABILITY: 1 of 1 C01 A3 | |
| | J |



| Annex 11.4.3 - Hydromorphological | Catchment | Assessment - 121 |
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|-----------------------------------|-----------|------------------|

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|--|--|---|--|---|
| Outcome Nature Section Planta Section Planta Major Outcome Nature Been Section Planta Control Nature Section Planta Control Nature Section Planta Control Nature Section Planta Control Nature Section Planta Wear Description Planta Major Restrict Control Nature Section Planta Control Nature Section Planta Control Nature Section Planta Control Nature Section Planta Based Planta Major Restrict Control Nature Section Planta Nature Section Planta Nature Section Planta Nature Section Planta Based Planta Nature Section Planta Nature Section Planta Nature Section Planta Nature Section Planta Nature Section Planta Based Planta Nature Section Planta Nature Section Planta Nature Section Planta Nature Section Planta Nature Section Planta Based Planta Nature Section Planta Nature Sec | | | | Natural |
| Generation Special Itensions Merge gauge in calcument (1) 9 WPD conductions Conductions 0 WPD conductions Exclusions Conductions Project conductions Conductions Conductions Geology Marcin flows and levels Conductions Provide conductions Conductions Conductions Geology Marcin flows and levels Conductions Provide conductions Sections Non- Provide conductions Sections Non- Provide conductions Sections Non- Sections Non- Non- Sections Sections Non- Sections Sections Non- Non- | Channel Nature | | | |
| Generalize Special Binetics Average splace in calculament [1] 9 WPD conductation Scatament or 2000 (or straw mell risk) 0 WPD conductation Marter, flows and levels Good Project conductation Marter, flows and levels Good Project conductation Marter, flows and levels Good Project conductation Cood Cood Beams Scatament or 2000 (or straw mell risk) Golds Paramete formation Paramete mestamet to wasthering, impermeable Forwing 11.4.12, Conductation Scatameter or 2000 (or straw mell risk) Scatameter or 2000 (or straw mell risk) Scatameter or 2000 (or straw mell risk) Forwing 11.4.12, Conductation (or straw mell risk) No Imperation (or straw mell risk) No Forwing 11.4.12, Conductation (or straw mell risk) No Imperation (or straw mell risk) No Forwing 11.4.12, Conductation (or straw mell risk) No Imperation (or straw mell risk) No Forwing 11.4.12, Conductation (or straw mell risk) No Imperation (or straw mell risk) No Forwing 11.4.12, Conductation (or straw mell risk) No No Imperation (or straw mell risk) N | | | | 2.2 |
| Image: Construction of the state of the | | | | |
| Wrb dissification Operal ecological status Good Recordsr Majority decide (Scie Drawing 11.4.3.1 and b Catchment 121) Gark Paammite formation Paammite (Existant to weathering, impermeable) Existant to weathering, impermeable Revisionmental designation (Scie Drawing 11.4.3.1 C Sanars/ SA No Image: Science 1000 Sectionmental designation (Scie Drawing 11.4.3.1 C Sanars/ SA No Image: Science 1000 Sectionmental designation (Scie Drawing 11.4.3.2 C Catchment 121 Sanars/ SA No Image: Science 1000 Sectionmental designation (Scie Drawing 11.4.3.2 C Catchment 121 Scie Science 1000 No Image: Science 1000 Image: Science 1000 Section 1210 Scie Science 1210 Control (Nill Science 1000) Yes Traggotter 1000 Image: Science 10000 Image: Sci | Elements | % Catchment over 750m (for snow melt risk) | | 0 |
| Densities acclegical status Monterere Gookgy Majority kednok (see Drawing 11.4.3.1 and & Catchment 12) Gald Paintific formation Ammitte formation Ammitter formatis and anammitter formation Ammitter formation Ammitter formatin | | | | |
| Geology Majority Bedick (see Drawing 11.4.3.1 a and b Catchment 121) Gaick Planment formation Planment medication of the second | Catchment Name Channel Nature Quantitative Spatial Elements WFD classification Geology Environmental designations (see Drawing 11.4.3.1 c, Catchment 121) Sediment source and supply - Catchment Scale Morphology and Process Reach upstream of crossing Morphology and Process At crossing Morphology and Process Reach downstream of | | | |
| Geology Is an allovial fan present at or near the cossing? No Environmental designations (see SAC. See SAC. No No Environmental designations (see SAC. See SAC. No No Environmental designations (see SAC. See SAC. No No Environmental designations (see SAC. See Drawing 11.4.3.2, Catchment 127 See Drawing 11.4.3.2, Catchment 127 Environmental designations (see Sachiment source potential, will be three a bage part risk. No High sediment source potential, will be transported directly to crossing directly to crossing d | | | 1 | 1 |
| designation (see prawing 11,43,1 Cathment 121) No International (Signature) Sediment scale Signature) No International (Signature) Sediment scale Signature) Signature) Signature) Sediment scale No International (Signature) International (Signature) Sediment scale No No International (Signature) International (Signature) Sediment scale Vertical inclose present in addiment (Signature) No Ioos scale Ioos scale Unogatade dars No Ioos scale Ioos scale Ioos scale Ioos scale Unogatade dars No Ioos scale Ioo | Geology | | Gaick Psammite formation-Psammite | resistant to weathering, impermeable |
| Orawing 11.4.3.1.c, catchment 121) No Image: In slope and channel confinement No Section 11.21) Changes in slope and channel confinement No Section 12.2. Is there a loge tyres in the catchment No Image: Im | Environmental | Ramsar | No | |
| Catchment 121) SS3 No Sediment 2012 SS3 No Sed Drawin 1.4.2. Catchment 121 Sediment 2014 No Sed Drawin 1.4.2. Catchment 121 Sediment 2014 No High sediment source potential, will be transported directly to crossing Current valley side or terrace erosion Ves High sediment source potential, will be transported directly to crossing Full signed fullers (including past sides and debris flows and sides) yes-many debris flows within catchment Hill signe failures (including past sides and debris flows and sides) yes-many debris flows within catchment Vertical incision generatin catchment No Low sediment source potential Unregetted bars No Low sediment source potential Unregetted bars No Low sediment source potential Unregetted bars No Low source of floatting debris Infrastructure type (see Drawing 1.4.3.1.4.3.1.4.4.4.4.4.4.4.4.4.4.4.4.4. | | | | |
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| Sediment source potential, will be transcension No Sediment source potential, will be transcension Yes High sediment source potential, will be transported directly to crossing Sediment source potential, will be transported directly to crossing High sediment source potential, will be transported directly to crossing Sediment source potential, will be transported directly to crossing High sediment source potential, will be transported directly to crossing Sediment source potential, will be transported directly to crossing No Low sediment source potential Sediment source potential No Low sediment source potential Sediment source potential No Low sediment source potential Unregetated bars No Low sediment source potential Unregetated bars No Low sediment source potential Unregetated bars No Low sediment source potential Comment on sediment source potential in catchment High sediment source potential Low sediment source potential Comment on sediment source potential to crossing Low sediment source potential Low sediment source potential Comment on sediment source potential to crossing Low sediment source potential Low sediment source potential Comment | | AL | Soo Drowing 1 | 1 4 2 2 Catchmont 121 |
| Item a log burk risk No Gurrent valley side or terrace erosion Yes High softment source potential, will be transported directly to cossing Sediment source potential, will be transported directly to cossing Yes High softment source potential, will be transported directly to cossing Sediment source potential, will be transported directly to cossing Yes High softment source potential, will be transported directly to cossing Sediment source potential No Low sediment source potential Concert source potential Baak erosing/relateral ingration No Low sediment source potential Concert source potential Mongetzed bars instructure type (see Drawing 11.4.3.1.6, Catchment 221) No Low sediment source potential Mongetzed bars instructure type (see Drawing 11.4.3.1.6, Catchment 221) No Low sediment source potential Comment on sediment source potential for adhysical de expositon Total of adhysical de expositon Total adhysical de expositon Morphology and Process Present adhysical de expositon Total adhysical de expositon Total adhysical de expositon Morphology and Process Connent on sediment source potential for adhysical de expositon Total adhysical de expositon Total adhysical de expositon <td></td> <td></td> <td></td> <td></td> | | | | |
| Sediment source and speciment source and speciment source and speciment source and speciment source potential, will be the source potential, will be transported directly to crossing dinterent source potential directly to crossing directly | | | No | |
| Sediment supply - clurical values used to channel It is loop failures (including peet sides and debris flows and sides) It is loop failures (including peet sides and debris flows and sides) It is loop failures (including peet sides and debris flows and sides) Sediment source potential Werkan including peet sides and debris flows and sides) No Iow sediment source potential Sediment Source potential Werkan including peet sides and source potential Iow source potential Iow source potential Unreget side fail No Iow source potential Iow source potential Worde Afforested ares in carbinent No Iow source potential Infrastructure type (see Drawing 11.4.3.1.d, Catchment 122) High sediment source potential from upper catchment from debris flows, shallow siles Comment on sediment source potential in catchment Source and confined towards crossing, funnelling sediment downstream Comment on sediment supply potential to crossing High sediment source potential from upper catchment from debris flows, shallow siles Morphology and Proces Predominant sediment size Boolder Unreget and basis None Ioward control of three crossing Predominant sediment size Boolder Ioward control control of three crossing Predominant sediment size | | Current valley side or terrace erosion | Yes | transported directly to crossing |
| Sediment source and supply - Channel incision present in catchment No High sediment source potential to crossing and not coupled with the channel Scale Bail ension/fateral migration No Low sediment source potential minimum to coupled with the channel Scale Bail ension/fateral migration No Low sediment source potential minimum to coupled with the channel Vertical incision present in catchment No Low sediment source potential infinitiature type (see Drawing 11.4.3.1.d, Catchment 121) Comment on sediment source potential in catchment No Low sediment source potential from upper catchment from upper catchment from debris flows, shallow siles and valley side ensions in Till and Alloval fan deposits bot are and faculey side ensions from Till and Alloval fan deposits for cassing with new for future transport Comment on sediment supply potential to crossing Medianet source potential for upper catchment from upper catchment from upper catchment for upper crossing with on a facter location (area of deposition) Morphology and Process Reach upstream crossing Channel morphology Bedrock Predominant sediment size Bouldern Unegetated bars None Vertical incision None Presence and nature of infrastructure (Map 10) None Presence and nature of infrastructure (Map 10) None | | Potential valley side or terrace erosion | | |
| Sediment source and suppir - Catchment Scale Vertical incision present in catchment Channel naturality incised Low sediment source potential Scale Bank erosion/lateral migration No Low sediment source potential Wooded/forested bars No Low sediment source potential Comment on sediment source potential in catchment No Low sediment source potential Comment on sediment source potential in catchment High sediment source potential from upper catchment from debris flows, shalow sides and valley side crossion in Till and Allival fan deposits Comment on sediment supply potential to crossing Container from hiliside to crossing, funnelling sediment downstream Crossing is then on a fulley side crossing, funnelling sediment downstream Crossing is then on a fulley side crossing, funnelling sediment downstream Crossing is then on a fulley side crossing Morphology and Proces Predominant sediment size Boulder Intrastructure type (see Drawing 11.4.3.1.4, Catchment 121) None Intrastructure type (see prawing 11.4.3.1.4, Catchment 121) Morphology and Proces Predominant sediment size Boulder Intrastructure type (see prawing 11.4.3.1.4, Catchment 121) Morphology and Proces Predominant sediment size Boulder Intrastructure type (see prawing 11.4.3.1.4, Catchment 122) Morphology and Proces | | Hill slope failures (including peat slides and debris flows and slides) | yes-many debris flows within catchment | High sediment source potential, but distant from |
| supply - Catchment Scale Bank erosion/lateral migration No Low sediment source potential (unegetated bas) Mo Low sediment source potential (unegetated bas) No Low sediment source potential (narstructure type (see Drawing 11-A3.1 d, Gatchment 121) Infrastructure type (see Drawing 11-A3.1 d, Gatchment 121) No Low sediment source potential (bas) sole erosion in 111 and Alluval fan depoists and value is bor disance factors and value is factors bor disance factors bor dis an beconon dis bor disance factors bor disance factor bor dis | | | | crossing and not coupled with the channel |
| Scale Investigated bars No Low sediment source opticitial Wooded/forested areas in catchment No Low sediment source opticitial (bw source of floating debris) Comment on sediment source potential in catchment No Low source of floating debris Comment on sediment source potential in catchment High sediment source optential flow, shallow sides and valley side erosion in Till and Alluvial fan deposits Comment on sediment supply potential to crossing Use of channets to crassport sediment shord distance from hill side to main channel Short area of reduced signe upstream of crossing, but sediment will remain here for future transport Comment on sediment supply potential to crossing Boot for anones to crossing, but sediment will remain here for future transport Morphology and Procesrift Predominant sediment size Boulder Vertical incision None Morehology Predominant sediment size Boulder Unvegetated bars Vertical incision Low Ender Predominant sediment size Boulder Unvegetated bars Vertical incision Low Ender Predominant sediment size Boulder Unvegetated bars Vertical incision Morehology Plane hed Predomin | | | | |
| Wooded/forested areas in catchment No Low source of floating debris Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) High sediment source potential from upper catchment from debris flows, shallow sides a construction in Till and Alluvia fan deposits Comment on sediment source potential in catchment Lots of channels to transport sediment short distance from hill dot to main channel Short area of reduced slope upstream of crossing will increase deposition here, reducing speed of transport from hillsde to crossing, but ediment will researe deposition Morphology and Process free and submit size Bedrock Predominant sediment size Boulder Unsegettate bars None Unsegettate bars None Vertical incision Low Predominant sediment size Low Unsegettate bars None Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA Predominant sediment size Boulder Unsegettate bars None Predominant sediment size Boulder Unsegettate bars None Predominant sediment size Boulder Unsegettate bars Some At crossing Predominant sediment size | | | | |
| Comment on sediment source potential in catchment High sediment source potential for upper catchment from debrs flows, shallow sides and valuey dide crossion in illian dallowish and exposits Morphology and Process Reach upstream of crossing Comment on sediment souply potential to crossing Lots of channels to transport sediment sing in increase deposition here, reducing speed of transport for inhibide to crossing, but sediment will remain here for future transport Morphology and Process Reach upstream of crossing Channel morphology Bedrock Predominant sediment size Unregetated bars None Interval Vertical incision Low Interval Predominant sediment (Map 10) None Interval Infrastructure (Map 10) None Interval Infrastructure (Map 10) None Interval Infrastructure (Map 10) None Interval Vertical incision Low Interval Predominant sediment size Boulder Interval Unregetated bars Some Available sediment at the crossing Predominant sediment size Boulder Interval Unregetated bars Some Available sediment at the crossing Vertical incision Hig | | | | |
| Comment on sediment source potential in datament and valley side ension in Till and Alluvial fan deposits Lots to channels to toransport sediment should stance from hills det to main channel Short area of reduced slope upstream of crossing ull increase deposition here, reducing speed of transport from hills de to ransing. Funnelling sediment will remain here for future transport Morphology and Process Channel morphology Bedrock Predominant sediment size Boulder Increase deposition Unsgetated bars None Increase deposition Vertical incision None Increase deposition Predominant sediment size Boulder Increase deposition Unsgetated bars None Increase deposition Predominant sediment size Low Increase Vertical incision Low Increase Predominant sediment size Low Increase Channel morphology Plane bed Increase Predominant sediment size Boulder Increase Unvegetated bars Some Available sediment at the crossing Vertical incision Med Increase Boulder Unvegetated bars Some< | | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) | | and the second for an electric former shall be all des- |
| Morphology and Processing Channel morphology Dedition Reach uptree of infrastructure (Map 1d) None None Presonical sediment size Boulder Deposition Presonical sediment size Boulder Deposition University Presonical sediment size Boulder University Deposition Low Presonical sediment size Boulder Deposition University Deposition Low Presonical sediment size Boulder Deposition Deposition Low Deposition Presonical sediment size Boulder Deposition Deposition Low Deposition Presence and nature of infrastructure (Map 1d) None None Presence and nature of infrastructure (Map 1d) None Deposition Channel morphology Plane bed Deposition Predominant sediment size Boulder Deposition Channel morphology Plane bed Deposition Channel morphology Plane bed Deposition Predominant sediment size Boulder Deposition Unvegetated bars Some Available sediment at the crossing Vertical incision Med Reduced by presence of Reno mattres, but t | | Comment on sediment source potential in catchment | | |
| Morphology and Process Reach upstream of crossing Predominant sediment size Boulder Morphology and Process Reach upstream of crossing Predominant sediment size None Morphology and Process Reach upstream of crossing Channel realignment Low Morphology and Process At crossing Channel morphology Plane bed Morphology and Process At crossing Channel morphology Plane bed Vertical incision Some Available sediment at the crossing Vertical incision Modent Some Vertical incision Modent None Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Deposition Low Single area of bank erosion at the crossing Damaged/unstable drains or armouring No No Morphology and Process At crossing Channel morphology Cascade Predominant sediment size Boulder Med Morphology and Process Predominant sediment size Yes Lots of available sediment | | Comment on sediment supply potential to crossing | speed of transport from hillside to crossing, but sediment will remain here for future transport Channel becomes steep and confined towards crossing, funnelling sediment downstream | |
| Morphology and Process Reach upstream of crossing Unvegetated bars None Vertical incision None Incision Lateral migration/bank erosion Low Incision Presence and nature of infrastructure (Map 1d) None Incision Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA Incision Channel realignment yes straightened at crossing Predominant sediment size Boulder Incision Estimated discharge at 1:200 event (m³/s) 11.6 Invegetated bars Unvegetated bars Some Available sediment at the crossing Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Vertical incision Med Single area of bank erosion at the crossing Deposition Lateral migration/bank erosion Low Damaged/unstable drains or armouring No Incision Wortphology and Process Predominant sediment size Boulder Unvegetated bars Channel morphology Cascade Predominant sediment size Boulder Unvegetated bars | | Channel morphology | Bedrock | |
| Morphology and Process Reach upstream of crossing Vertical incision None Lateral migration/bank erosion Low | | | | |
| Reach upstream of crossing Deposition Low Image: construction of the presence and nature of infrastructure (Map 1d) None Presence and nature of infrastructure (Map 1d) None Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA Image: construction of the presence and nature of infrastructure (Map 1d) None Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA Image: construction of the presence and nature of infrastructure (Map 1d) None Morphology and Process At crossing Channel morphology Plane bed Image: construction of the presence and construction of the presence of Reno mattress, but this has been reworked indicating excess energy Morphology and Process At crossing Vertical inclsion Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Deposition Lateral migration/bank erosion Low Single area of bank erosion at the crossing Deposition Lateral migration/bank erosion at mouring No No Image: construction of the crossing Morphology and Process Reach downstream of crossing Channel morphology Cascade Image: construction of the crossing Morphology and Process Vertical inclsion Med Concentrated just downstream of the crossing </td <td>Morphology and Process-</td> <td></td> <td></td> <td></td> | Morphology and Process- | | | |
| Lateral migration/bank ension Low Presence and nature of infrastructure (Map 1d) None Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA Channel realignment yes Straightened at crossing Channel morphology Plane bed Predominant sediment size Boulder Estimated discharge at 1:200 event (m³/s) 11.6 Unvegetated bars Some Vertical incision Med Deposition Lateral migration/bank erosion Lateral migration/bank erosion Cascade Vertical incision No | | Deposition | | |
| Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA Channel realignment yes Straightened at crossing Channel morphology Plane bed Predominant sediment size Boulder Estimated discharge at 1:200 event (m ³ /s) 11.6 Unvegetated bars Some Vertical incision Med Deposition Lateral migration/bank erosion Lateral migration/bank erosion No Morphology and Process- Reach downstream of crossing Channel morphology Vertical incision Med Channel morphology Cascade Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) NA | crossing | | | |
| Morphology and Process- At crossing Channel morphology Predominant sediment size Boulder Vertical incision 11.6 Unvegetated bars Some A vailable sediment at the crossing Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Deposition High Lateral migration/bank erosion Low Single area of bank erosion at the crossing Damaged/unstable drains or armouring No Morphology and Process- Reach downstream of crossing Vertical incision Morphology and Process- Reach downstream of crossing Vertical incision Morphology and Process- Reach downstream of crossing Vertical incision | | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) | | |
| Morphology and Process- At crossing Predominant sediment size Boulder Morphology and Process- At crossing Estimated discharge at 1:200 event (m³/s) 11.6 Unvegetated bars Some Available sediment at the crossing Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Deposition High Lots of available sediment Lateral migration/bank erosion Low Single area of bank erosion at the crossing Damaged/unstable drains or armouring No No Morphology and Process- Reach downstream of crossing Vertical incision Med Morphology and Process- Reach downstream of crossing Vertical incision Med Concentrated just downstream of the crossing Deposition High Lots of available sediment Med | | Channel realignment | yes | straightened at crossing |
| Morphology and Process- At crossing Estimated discharge at 1:200 event (m³/s) 11.6 Unvegetated bars Some Available sediment at the crossing Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Deposition High Lots of available sediment Lateral migration/bank erosion Low Single area of bank erosion at the crossing Damaged/unstable drains or armouring No Single area of bank erosion at the crossing Morphology and Process- Reach downstream of crossing Vertical incision Med Deposition Med Concentrated just downstream of the crossing Deposition Med Concentrated just downstream of the crossing | | | | |
| Morphology and Process- At crossing Channel morphology Channel morphology Cascade End Morphology and Process- At crossing Channel morphology Cascade Image: Concentrate distance | | | | |
| At crossing Vertical incision Med Reduced by presence of Reno mattress, but this has been reworked indicating excess energy Deposition High Lots of available sediment Lateral migration/bank erosion Low Single area of bank erosion at the crossing Damaged/unstable drains or armouring No No Predominant sediment size Boulder Imaged/unstable sediment Unvegetated bars Yes Lots of available sediment Vertical incision Med Concentrated just downstream of the crossing Predominant sediment size Med Concentrated just downstream of the crossing Presition Med Med Concentrated just downstream of the crossing Deposition High Lots of available sediment Concentrated just downstream of the crossing Presition High Lots of available sediment Concentrated just downstream of the crossing Deposition High Lots of available sediment Concentrated just downstream of the crossing Reduction None None Lots of available sediment Lots of available sediment | | | | Available sediment at the crossing |
| Lateral migration/bank erosion Low Single area of bank erosion at the crossing Damaged/unstable drains or armouring No No Reach downstream or crossing Channel morphology Cascade Vertical incision Yets Lots of available sediment Deposition Med Concentrated just downstream of the crossing Deposition High Increased Lateral migration/bank erosion None Increased | | Vertical incision | Med | |
| Damaged/unstable drains or armouring No Damaged/unstable drains or armouring No Channel morphology Cascade Predominant sediment size Boulder Unvegetated bars Yes Vertical incision Med Deposition High Lateral migration/bank erosion None | | Deposition | | Lots of available sediment |
| Channel morphology Cascade Predominant sediment size Boulder Unvegetated bars Yes Vertical incision Med Deposition High Lateral migration/bank erosion None | | | | Single area of bank erosion at the crossing |
| Predominant sediment size Boulder Morphology and Process- rcrossing Vertical incision Yes Lots of available sediment Deposition Med Concentrated just downstream of the crossing Lateral migration/bank erosion None | | pamageu/unstable drains or armouring | NU | I |
| Morphology and Process- rcrossing Unvegetated bars Yes Lots of available sediment Durphology and Process- rcrossing Vertical incision Med Concentrated just downstream of the crossing Deposition High Incision High Incision Letral migration/bank erosion None Incision Incision | | | | |
| Morphology and Process- Reach downstream of crossing Vertical incision Med Concentrated just downstream of the crossing Deposition Lateral migration/bank erosion High < | | | | Lots of available sediment |
| Beach downstream of crossing Deposition High Lateral migration/bank erosion None | | | | |
| crossing Lateral migration/bank erosion None | | | | Concentrated just downstream of the crossing |
| | crossing | | | |
| | | Presence and nature of infrastructure (Map 1d) | Railway crossing | |
| Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) Impounding flows and fixing channel Increase deposition upstream Channel realignment yes straightened at crossing | | | | |
| Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) Impounding flows and fixing channel Increase deposition upstream | | Predominant sediment size Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 121) | Boulder Yes Med High None Railway crossing Impounding flows and fixing channel | Concentrated just downstream of the crossing |
| | Summany babaviour | High sediment source and supply potential to the crossing from valle | y side erosion, upstream of a very steep cl | hannel |
| Downstream incision caused by scour from the crossing | Summary behaviour | Low risk of upstream incision-bedrock Med risk for bypassing crossing- erosion on left bank side upstream | | |



Flow through rather than over mattress causing collapse

Channel incision due to step

Photograph 11.4.3.108- Upstream to crossing



Photograph 11.4.3.109-Channel



Photograph 11.4.3.110- Downstream

Deposition of sediment where floodplain opens up

> Flow through mattress scouring below



Photograph 11.4.3.111- Area of scour



Photograph 11.4.3.112-Upstream

Wave bed forms formed by reworking of gravel in gabions

Some cobble deposition over mattress



Photograph 11.4.3.113- Downstream



Photograph 11.4.3.114- Upstream

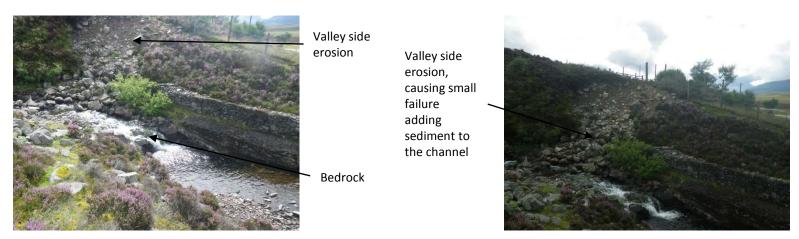
Some cobble deposition over mattress

Photograph 11.4.3.115- Downstream under crossing



Photograph 11.4.3.116- Upstream to bedrock channel

Photograph 11.4.3.117 – Downstream to crossing



Photograph 11.4.3.118- Left bank

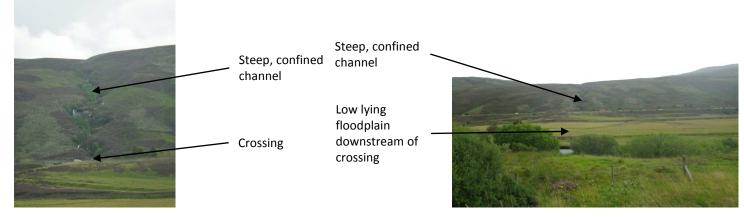
Photograph 11.4.3.119-Left bank





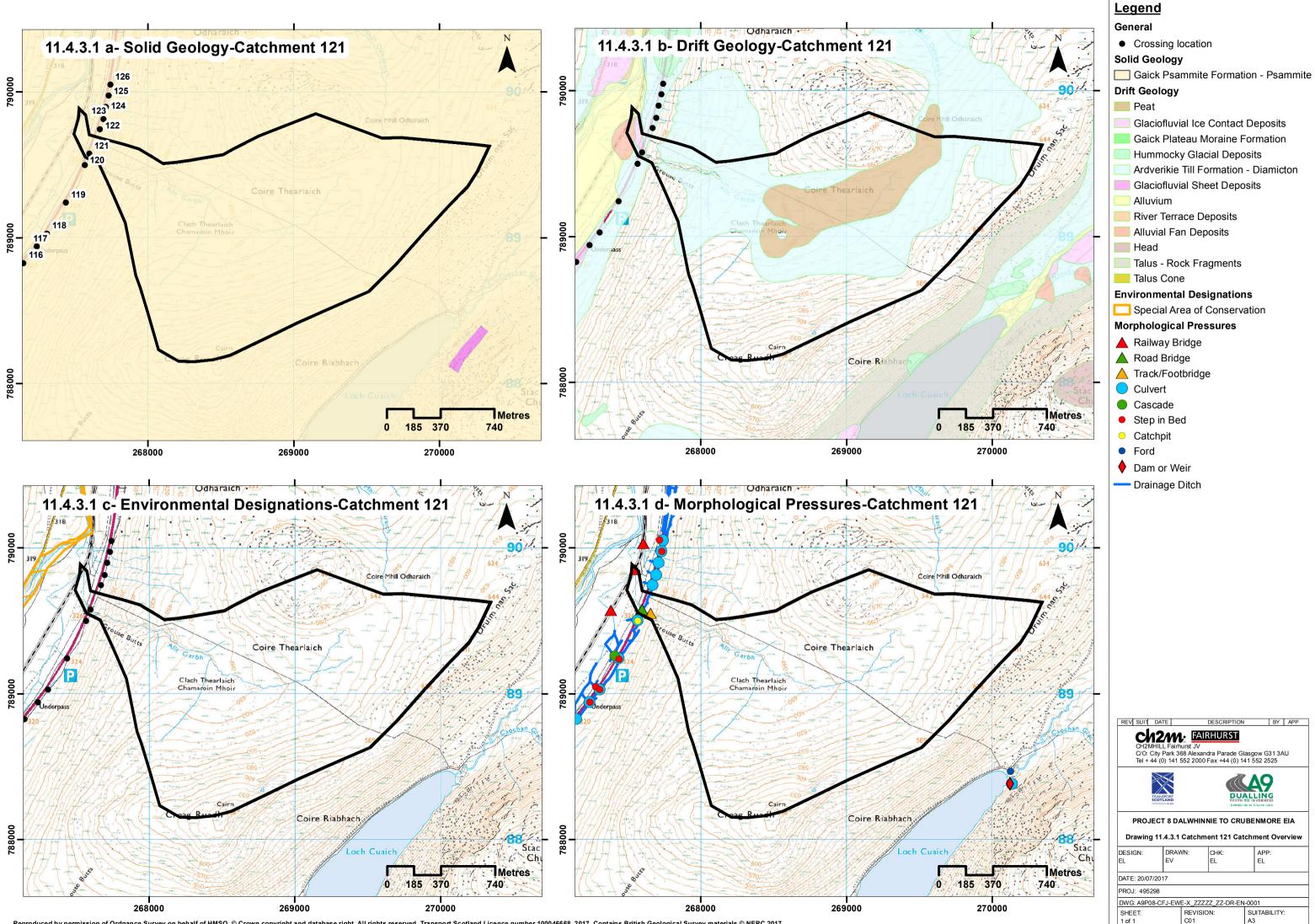


Photograph 11.4.3.120 – Downstream of crossing- steep sided channel

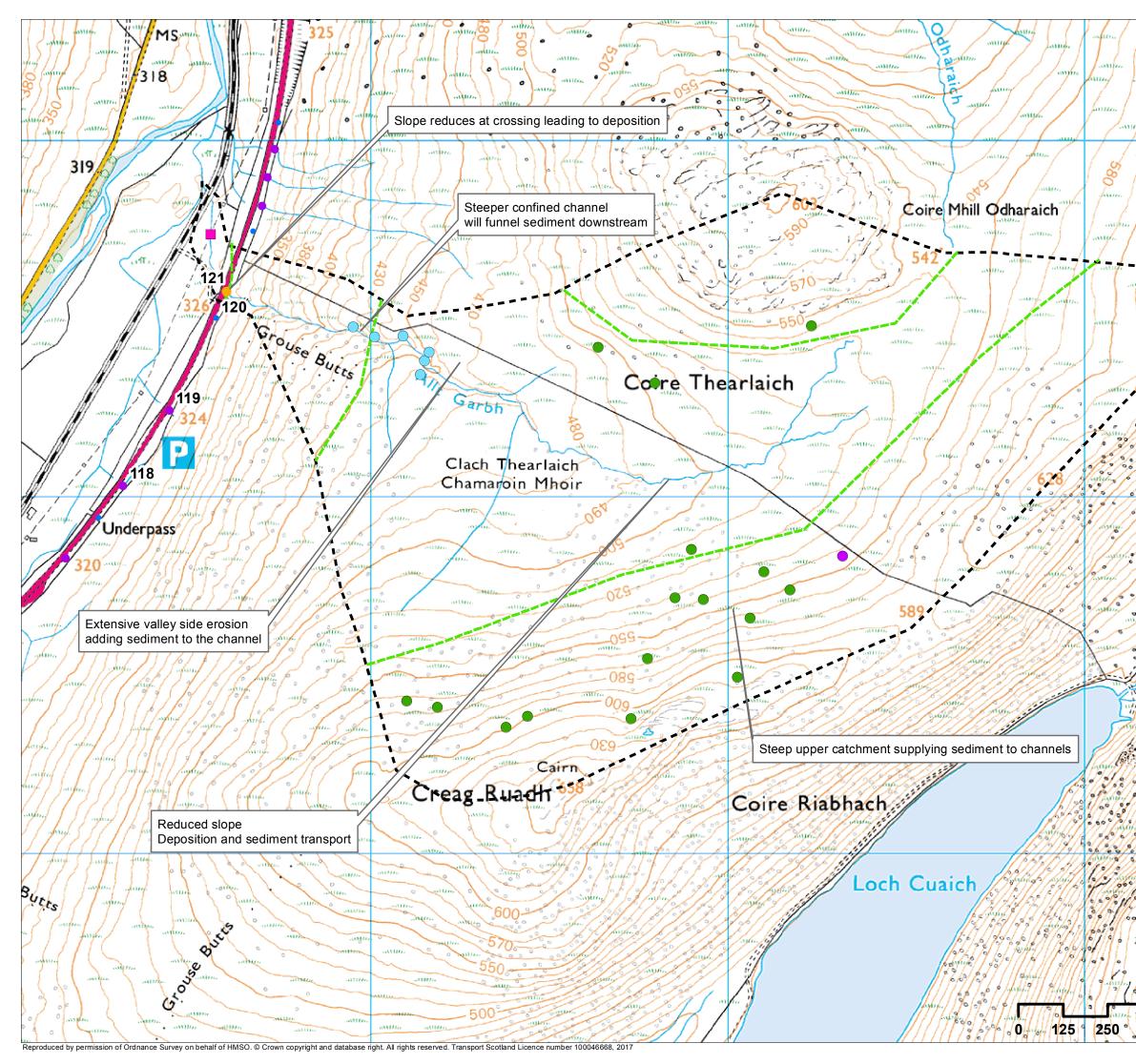


Photograph 11.4.3.122-Steep narrow catchment

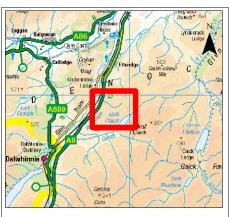
Photograph 11.4.3.123- Catchment



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Legend

| • | Major crossing |
|------------|---------------------|
| • | Minor crossing |
| • | Other crossing |
| | Coupled debris flow |
| | Debris flow |
| \bigcirc | Valley side erosion |
| | Unvegetated bar |
| | Break in slope |

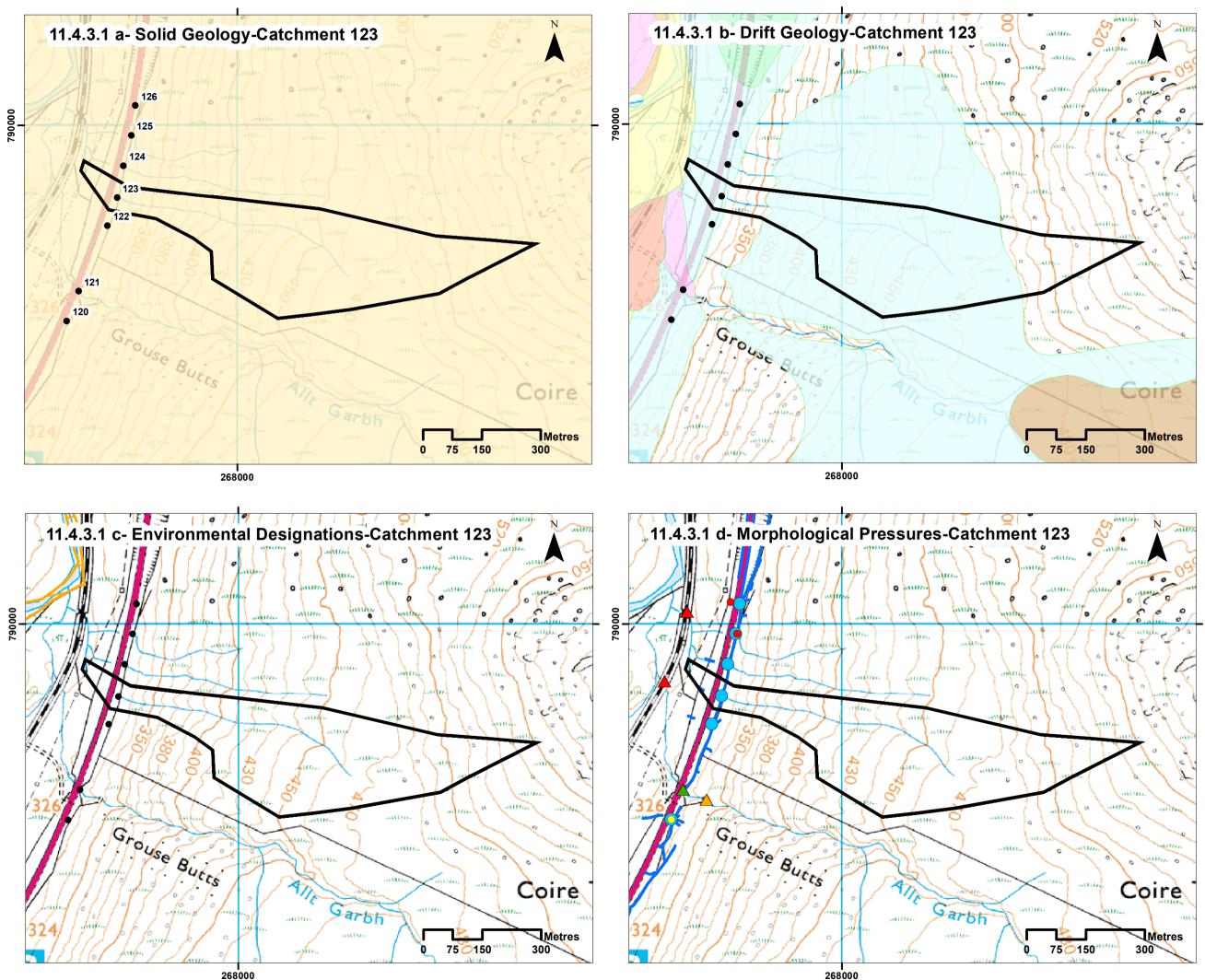
Crossing catchment



DRAWING 11.4.3.2. Catchment 121 Baseline Assessment

| DESIGN: | DRAWN: | AWN: CHK: APP: | | | |
|--|-------------|----------------|--------------------|--|--|
| EL | AB | EL | EL | | |
| DATE: 11/07/2017 PROJ: 495298 | | | | | |
| PROJ: 495298 | | | | | |
| DWG: A9P08-CFJ-EWE-X_ZZZZZ_ZZ-DR-EN-0002 | | | | | |
| SHEET: 1 of 1 | REVI C01 | SION: | SUITABILITY: A3 | | |

| h | , | 1 | | | | |
|--|--|---|--|--|--|--|
| Catchment No. Catchment Name | 123 | | | | | |
| | - | l | | | | |
| Character | Nature of water course | | Natural | | | |
| Channel Nature | Size of water course | | Minor | | | |
| | | | | | | |
| Quantitative Spatial | Catchment Area (km ²) | | 0.2 | | | |
| Elements | Average slope in catchment (°) % Catchment over 750m (for snow melt risk) | | <u>10</u> 0 | | | |
| | | | 0 | | | |
| | Water, flows and levels Physical condition | | Good Good | | | |
| WFD classification | Overall ecological status | | Moderate | | | |
| | | | | | | |
| | Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 123) | Gaick Psammite formation-Psammite | resistant to weathering, impermeable | | | |
| Geology | Is an alluvial fan present at or near the crossing? | No | | | | |
| | | | | | | |
| Environmental | Ramsar | No | | | | |
| designations (see | SAC | No | | | | |
| Drawing 11.4.3.1 c, | SPA | No | | | | |
| Catchment 123) | SSSI | No | | | | |
| | Changes in slope and channel confinement | See Drawing | 11.4.3.2, Catchment 123 | | | |
| | Is peat present in the catchment | Yes | Limited amount possible in headwaters | | | |
| | Is there a bog burst risk Current valley side or terrace erosion | No | | | | |
| | Potential valley side or terrace erosion | Yes | 600m | | | |
| | Hill slope failures (including peat slides and debris flows and slides) | No | | | | |
| | Hill slope failures coupled to channel Vertical incision present in catchment | No | | | | |
| Sediment source and | Bank erosion/lateral migration | No | | | | |
| supply - Catchment Scale | Unvegetated bars | No | | | | |
| | Wooded/forested areas in catchment Infrastructure type (see Drawing 11.4.3.1 d, Catchment 123) | No | | | | |
| | innastructure type (see brawing 11.4.5.1 d, catchment 12.5) | | moment with incision limited to immediately u/s | | | |
| | Comment on sediment source potential in catchment | | el changes (e.g. further cutting into hillslope) may | | | |
| | | | hannel with very limited flood plain may lead to discussion discussion discussion discussion discussion of the second sec | | | |
| | | High, if the sources are created, as catchment is steep with high supply potent | | | | |
| | Comment on sediment supply potential to crossing | opportunities for depositi | on within the catchment are limited. | | | |
| l | Channel morphology | Cascade | | | | |
| | Predominant sediment size | Large Gravel and Cobble | | | | |
| | Unvegetated bars | No | | | | |
| Morphology and Process- Reach upstream of | Vertical incision Deposition | Medium Low | | | | |
| crossing | Lateral migration/bank erosion | Low | | | | |
| | Presence and nature of infrastructure (Map 1d) | No | | | | |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 123) Channel realignment | No | | | | |
| | | | | | | |
| | Channel morphology | Engineered | | | | |
| | Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) | Cobble 0.6 | | | | |
| | Unvegetated bars | Yes | at outflow of culvert - deposited sediment | | | |
| Morphology and Process- | | Low | forming bar | | | |
| At crossing | Vertical incision | | at outflow of culvert - deposited sediment | | | |
| | Deposition | Medium | forming bar | | | |
| | Lateral migration/bank erosion | Low | | | | |
| | Damaged/unstable drains or armouring | Yes | Evidence of paving slabs torn up u/s of crossing | | | |
| | | | | | | |
| | Channel morphology Predominant sediment size | Plane bed Cobble | | | | |
| | Unvegetated bars | No | | | | |
| | | | Incision may have occurred previously (during big | | | |
| | Vertical incision | Medium | events?) but vegetation encroaching on channel | | | |
| Morphology and Process- Reach downstream of | | | indicates that the channel is mostly stable at present. | | | |
| crossing | Deposition | Low | | | | |
| | Lateral migration/bank erosion Presence and nature of infrastructure (Map 1d) | Low Yes | | | | |
| | | | Channel probably realigned to join others to | | | |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 123) | Railway | pass under railway at one single point. | | | |
| - | Channel realignment | Yes | See above | | | |
| Summary behaviour | This is a long, narrow and steep catchment which for most of it's ler erosion of the valley slide toes and subsequent coupled hillslope fai coarse sediment which is being transported through the crossing and up paving slaps (armouring) both u/s and d/s of the culvert indicates energy profile and there | lures. Incision appears to have occurred d being deposited at the d/s end of the c | immediately u/s of the crossing and is generating ulvert where gradient reduces. Evidence of ripped careful design needed to avoid creating increased | | | |
| | up paving slaps (armouring) both u/s and d/s of the culvert indicates | that this a high energy channel. Suggest | careful design needed to avoid creating increas | | | |



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| <u>Legend</u> | | | | | |
|--|--------------|-------------|---------------|--|--|
| General | | | | | |
| Crossi | na locatio | n | | | |
| Solid Geo | - | | | | |
| | | Formati | on Peammit | | |
| Gaick Psammite Formation - Psammite | | | | | |
| Drift Geology | | | | | |
| Peat | | _ | | | |
| | fluvial Ice | | • | | |
| | Plateau M | | | | |
| | ocky Glac | - | | | |
| | | | - Diamicton | | |
| Glacio | | et Depos | sits | | |
| Alluviu | | | | | |
| River 7 | | | | | |
| Alluvia | I Fan Dep | osits | | | |
| Head | | | | | |
| Talus - | Rock Fra | gments | | | |
| Talus (| Cone | | | | |
| Environme | ental Des | ignation | s | | |
| 🔲 Specia | I Area of | Conserva | ition | | |
| Morpholog | gical Pres | sures | | | |
| 🔺 Railwa | y Bridge | | | | |
| Road I | Bridge | | | | |
| Track/ | - | Э | | | |
| Culver | - | | | | |
| Step ir | | | | | |
| Catchp | | | | | |
| - Draina | | | | | |
| | | | | | |
| REV SUIT DATE DESCRIPTION BY APP Ch20000 FAIRHURST CH2MHILL Fairhurst JV C/O: City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Image: Constraint of the second s | | | | | |
| C/O: City I Tel + 44 (0 | AL ALBA | Datwhinnie | to Crubenmere | | |
| C/O: City Tel + 44 (0 PROJECT | T 8 DALWHINI | NIE TO CRUI | to Crubenmere | | |

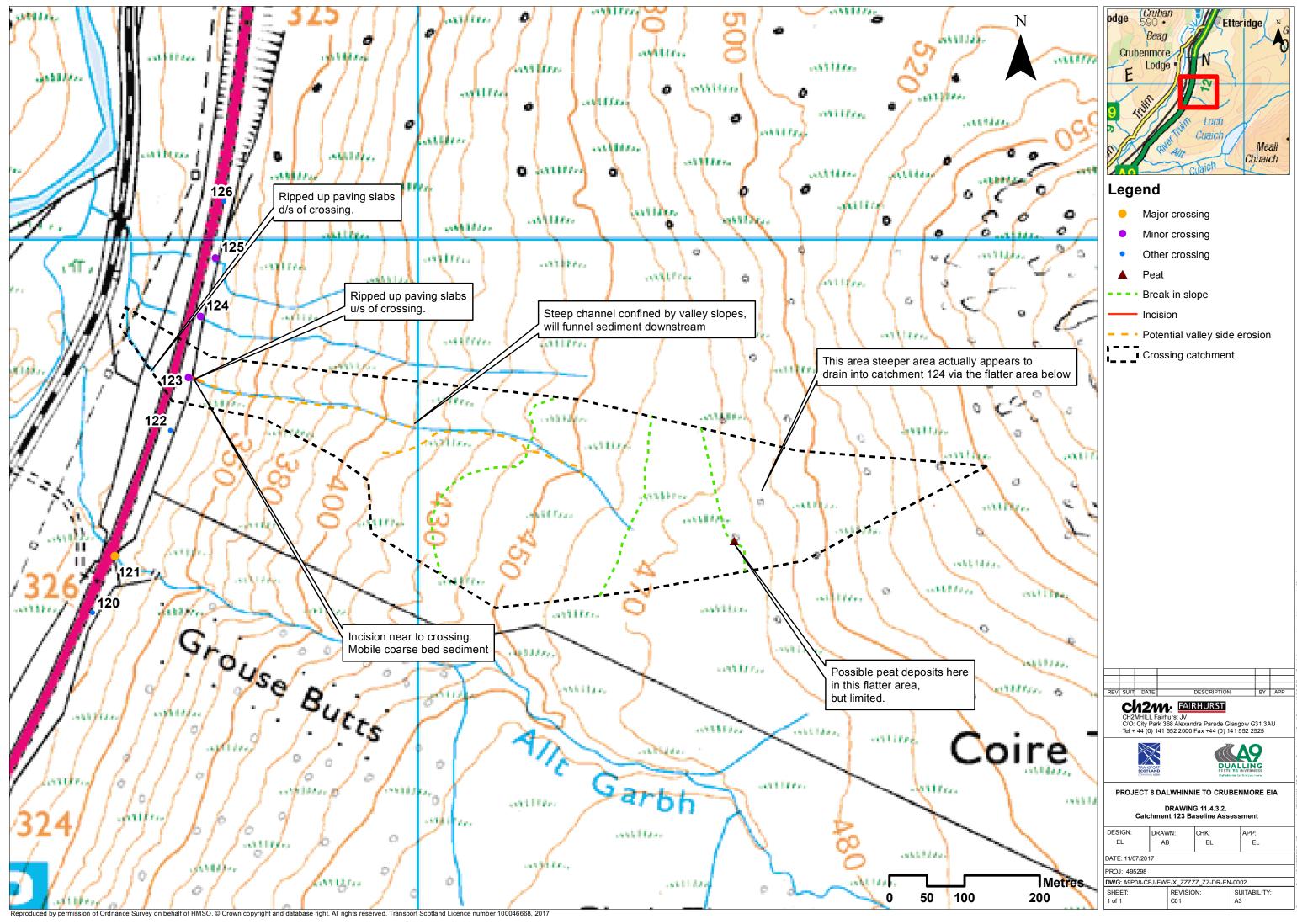
PROJ: 495298

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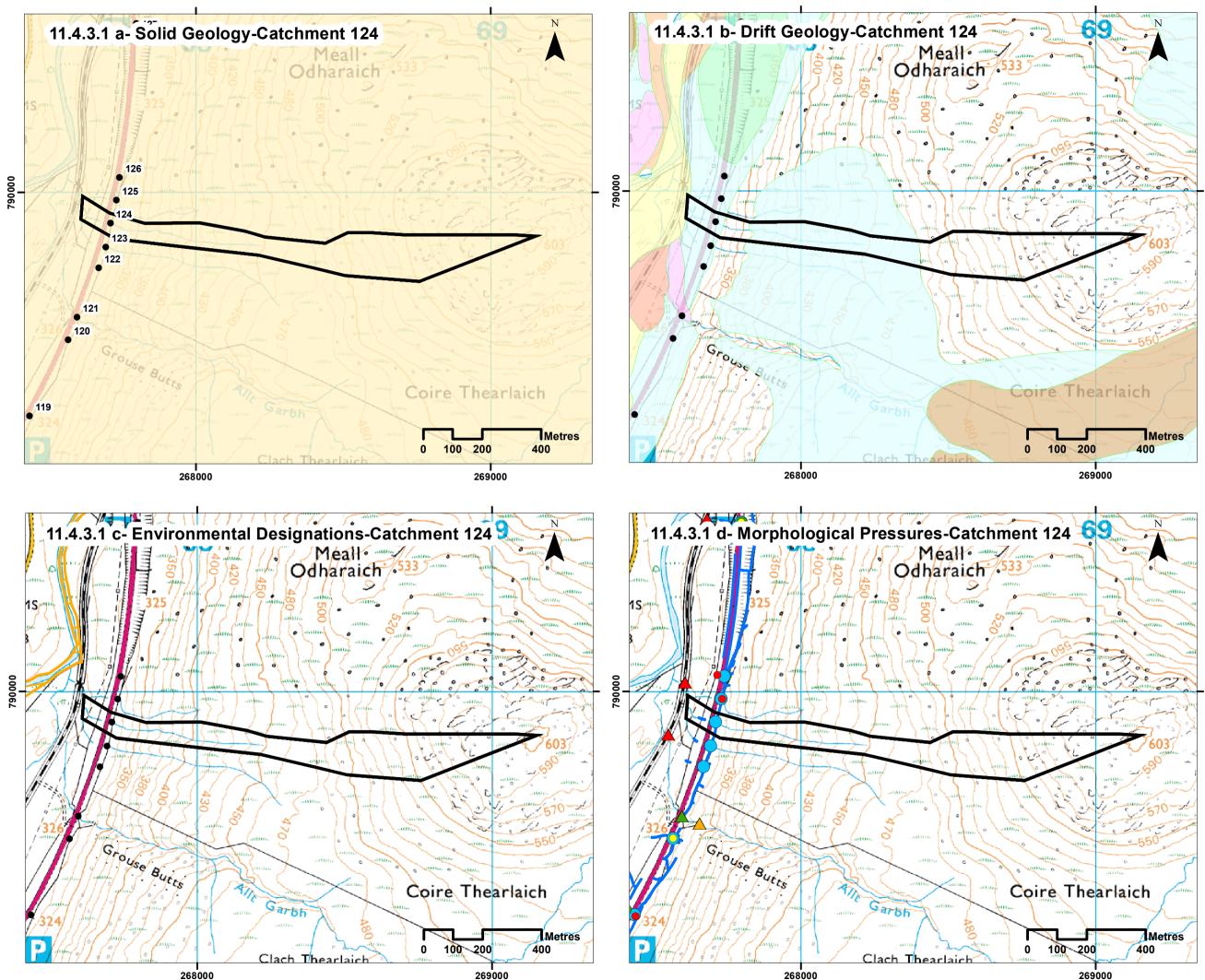
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SUITABILITY:

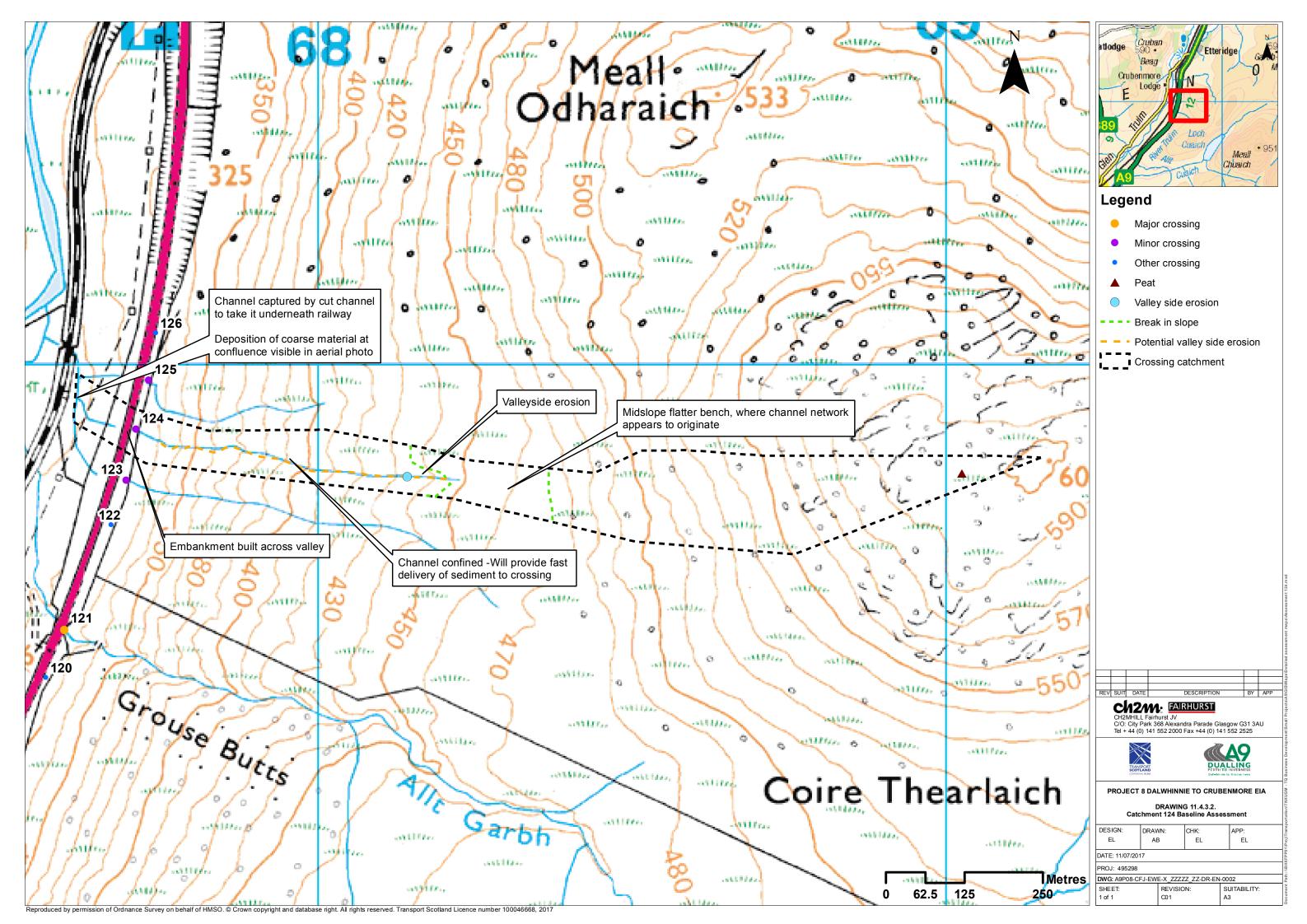


Catchment No. 124 Catchment Name Nature of water course Natural Channel Nature Size of water course Minor Catchment Area (km²) 0.1 **Quantitative Spatial** 11.8 Average slope in catchment (°) Elements % Catchment over 750m (for snow melt risk) 0 Water, flows and levels Good WFD classification Physical condition Good Moderate Overall ecological status Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 124) Gaick Psammite formation-Psammite resistant to weathering, impermeable Geology Is an alluvial fan present at or near the crossing? No Environmental Ramsar No designations (see SAC No Drawing 11.4.3.1 c, SPA No Catchment 124) 1222 No Changes in slope and channel confinement See Drawing 11.4.3.2, Catchment 124 Indicated in very uppermost part of catchment in Is peat present in the catchment Yes watershed area, but very limited. No Is there a bog burst risk No Frosion of valley sides evident in mid catchment Current valley side or terrace erosion Yes where channel incised Potential valley side or terrace erosion Yes In incised channel Sediment source and Hill slope failures (including peat slides and debris flows and slides) No supply - Catchment Hill slope failures coupled to channel No Scale Vertical incision present in catchment Yes On steeper slope into main Truim valley No Bank erosion/lateral migration No Unvegetated bars Wooded/forested areas in catchment No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 124) No Sediment in channel bed appears mobile and likely supply is from erosion of incised channe Comment on sediment source potential in catchment valley sides in mid catchment Channel is steep all the way to the crossing so high potential for sediment transfer to Comment on sediment supply potential to crossing crossing Channel morphology Cascade Gravel-cobble Predominant sediment size Unvegetated bars No Morphology and Process Low Vertical incision Incision reduces towards crossing Deposition Reach upstream of Medium Lateral migration/bank erosion crossing Low Presence and nature of infrastructure (Map 1d) No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 124) No Channel realignment No Channel morphology Engineered Pipe culvert Predominant sediment size Small cobble Estimated discharge at 1:200 event (m³/s) 0.5 No Unvegetated bars Morphology and Process None Vertical incision At crossing Coarse material deposited at culvert entrance Medium Deposition where gradient reduces Lateral migration/bank erosion Low Damaged/unstable drains or armouring No Plane bed Channel morphology Predominant sediment size Pebble-cobble Unvegetated bars No Vertical incision Medium Channel incised into slope below road Coarse material deposited in fan at confluence Medium Morphology and Process Deposition with channel that collects flow to go under Reach downstream of railway bridge Lateral migration/bank erosion crossing low Presence and nature of infrastructure (Map 1d) No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 124) No Captured by channel d/s of road designed to take Channel realignment Yes flow of this channel and 123 and 125 through on single railway culvert Channels don't fully form in catchment until downslope edge of flatter 'bench' in the mid-catchment. Downstream/slope of this the channel has incised (like its neighbours) creating a very narrow and steep lower catchment until the road crossing. Sediment appears to be generated from this vertically incised section and is deposited immediately u/s of the crossing when gradient reduces. Crossing is a relatively small aperture pipe culvert through an embankment which is built across Summary behaviour the valley this channel has incised, indicating high flows are probably substantially restricted. D/s of the road the channel is incised until gradient reduces at confluence with cross-cutting channel which takes flow of 124 and its neighbours through one railway crossing. Between the end of the incised section and the confluence there is a fan-like deposit of coarse material visible in the aerial photos.

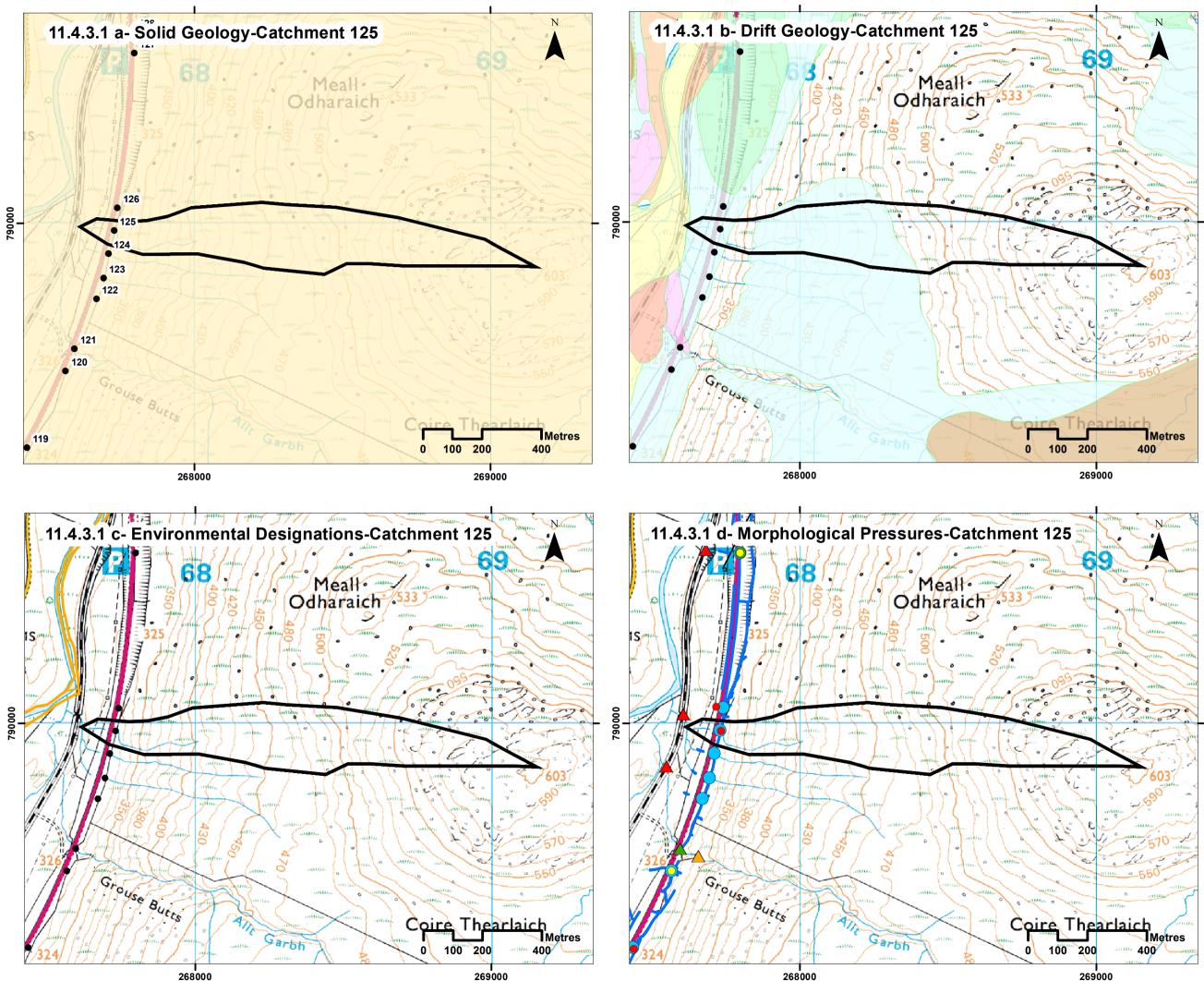


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| Gen | gend | | | | | |
|----------------------------------|---|--|--|--|--|--|
| | eral | | | | | |
| • | Crossing location | | | | | |
| Soli | d Geology | | | | | |
| | Gaick Psammite Formation - Psammite | | | | | |
| Drif | t Geology | | | | | |
| Peat | | | | | | |
| | Glaciofluvial Ice Contact Deposits | | | | | |
| | Gaick Plateau Moraine Formation | | | | | |
| | Hummocky Glacial Deposits | | | | | |
| | Ardverikie Till Formation - Diamicton | | | | | |
| | Glaciofluvial Sheet Deposits | | | | | |
| | Alluvium | | | | | |
| | River Terrace Deposits | | | | | |
| | Alluvial Fan Deposits | | | | | |
| | Head | | | | | |
| | Talus - Rock Fragments | | | | | |
| | Talus Cone | | | | | |
| Env | ironmental Designations | | | | | |
| | Special Area of Conservation | | | | | |
| _ | phological Pressures | | | | | |
| | Railway Bridge | | | | | |
| | Road Bridge | | | | | |
| | Track/Footbridge | | | | | |
| | Culvert | | | | | |
| | Cascade | | | | | |
| - | Step in Bed | | | | | |
| | Catchpit | | | | | |
| | Drainage Ditch | | | | | |
| | Power Lines | | | | | |
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| REV | SUIT DESCRIPTION BY APP CH2MHILL Fairhurst JV CVC: City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 | | | | | |
| | CH2MHILL Fairhurst JV CYC: City Park 368 Alexandra Parade Glasgow G31 3AU | | | | | |
| | CH2MHILL Fairhurst JV C/C Citly Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 | | | | | |
| Dr | CH2MIHLL Fairhurst JV CYC City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Difference | | | | | |
| Dr DESI EL | CH2MIILL Fairhurst JV C/O: Citly Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Image: Comparison of the state o | | | | | |
| Dr DESI EL DATE | CH2MIHLL Fairhurst JV CYC City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Difference | | | | | |
| Dr DESI EL DATE PRO. | CH2MHILL Fairhurst JV CYC: City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 255 Difference Diffe | | | | | |



125 Catchment No. Catchment Name Nature of water course Natural Channel Nature Size of water course Minor 0.2 Catchment Area (km²) Quantitative Spatial 11.8 Average slope in catchment (°) Flements % Catchment over 750m (for snow melt risk) 0 Water, flows and levels Good WFD classification Physical condition Good Overall ecological status Moderate Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 125) Gaick Psammite formation-Psammite resistant to weathering, impermeable Geology Is an alluvial fan present at or near the crossing? No Environmental No Ramsar designations (see SAC No Drawing 11.4.3.1 c, SPA No Catchment 125) SSSI No See Drawing 11.4.3.2, Catchment 125 Changes in slope and channel confinement No Is peat present in the catchment No Is there a bog burst risk Current valley side or terrace erosion Yes Potential valley side or terrace erosion Yes 0 17 Hill slope failures (including peat slides and debris flows and slides) Yes Vegetated over Hill slope failures coupled to channel No Vertical incision leading to slope failure on right Sediment source and Vertical incision present in catchment Yes upply - Catchment Scale bank u/s of crossing Bank erosion/lateral migration No No Unvegetated bars Wooded/forested areas in catchment No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 125) None Comment on sediment source potential in catchment Eroding till valley sides potential to supply fines and coarse material High - Eroding valley side immediately upstream of crossing. Steep channel will deliver Comment on sediment supply potential to crossing sediment to crossing Cascade Channel morphology Predominant sediment size Coarse Unvegetated bars No Vertical incision High Morphology and Process Deposition Low Reach upstream of Lateral migration/bank erosion High crossing Presence and nature of infrastructure (Map 1d) No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 125) No Not evident from historic maps, but must be to Channel realignment Yes achieve one of the two near 90° bends just u/s of crossing Channel morphology Cascade Predominant sediment size Coarse 0.7 Estimated discharge at 1:200 event (m³/s) Morphology and Process Unvegetated bars None At crossing Vertical incision Low Deposition Low Lateral migration/bank erosion Low Damaged/unstable drains or armouring No Channel morphology Cascade Coarse (gravel-cobble) Predominant sediment size Unvegetated bars No Vertical incision High Morphology and Process Deposition Low Reach downstream of Lateral migration/bank erosion Low crossing No Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 125) No Captured by another tributary coming in from the Channel realignment Yes left bank to go under the railway Summary behaviour Some realignment undertaken to take watercourse through the crossing. Evidence of valley side erosion upstream and vertical incision downstream



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| Legend | | | |
|---------------|--------------------------------|---------------|---------------------------------|
| General | | | |
| Crossir | ng locatio | on | |
| Solid Geol | ogy | | |
| Gaick I | Sammite | e Forma | ation - Psammi |
| Drift Geolo | gy | | |
| Peat | | | |
| Glaciof | iuvial Ice | Contac | t Deposits |
| | | | Formation |
| Humm | | | |
| | - | • | n - Diamicton |
| Glaciof | | | |
| Alluviu | | | 0010 |
| River T | | onocite | |
| Alluvia | | | |
| Head | ran De | posits | |
| | De els En | | _ |
| Talus - | | agments | ⁵ |
| Talus C | | | |
| Environme | | - | |
| Specia | | | vation |
| Morpholog | • | ssures | |
| 🔺 Railwa | | | |
| 🔺 Road E | - | | |
| A Track/F | - | e | |
| Culvert | | | |
| 🔵 Cascad | de | | |
| 🔸 Step in | Bed | | |
| Oatchp | vit | | |
| - Draina | ge Ditch | | |
| - Power | Lines | | |
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| TRANS | CORT | | ALLING JALLING INVERNES |
| PROJECT | 8 DALWHIN | | |
| Drawing 11. | 4.3.1 Catchn | nent 125 C | atchment Overview |
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DATE: 20/07/2017

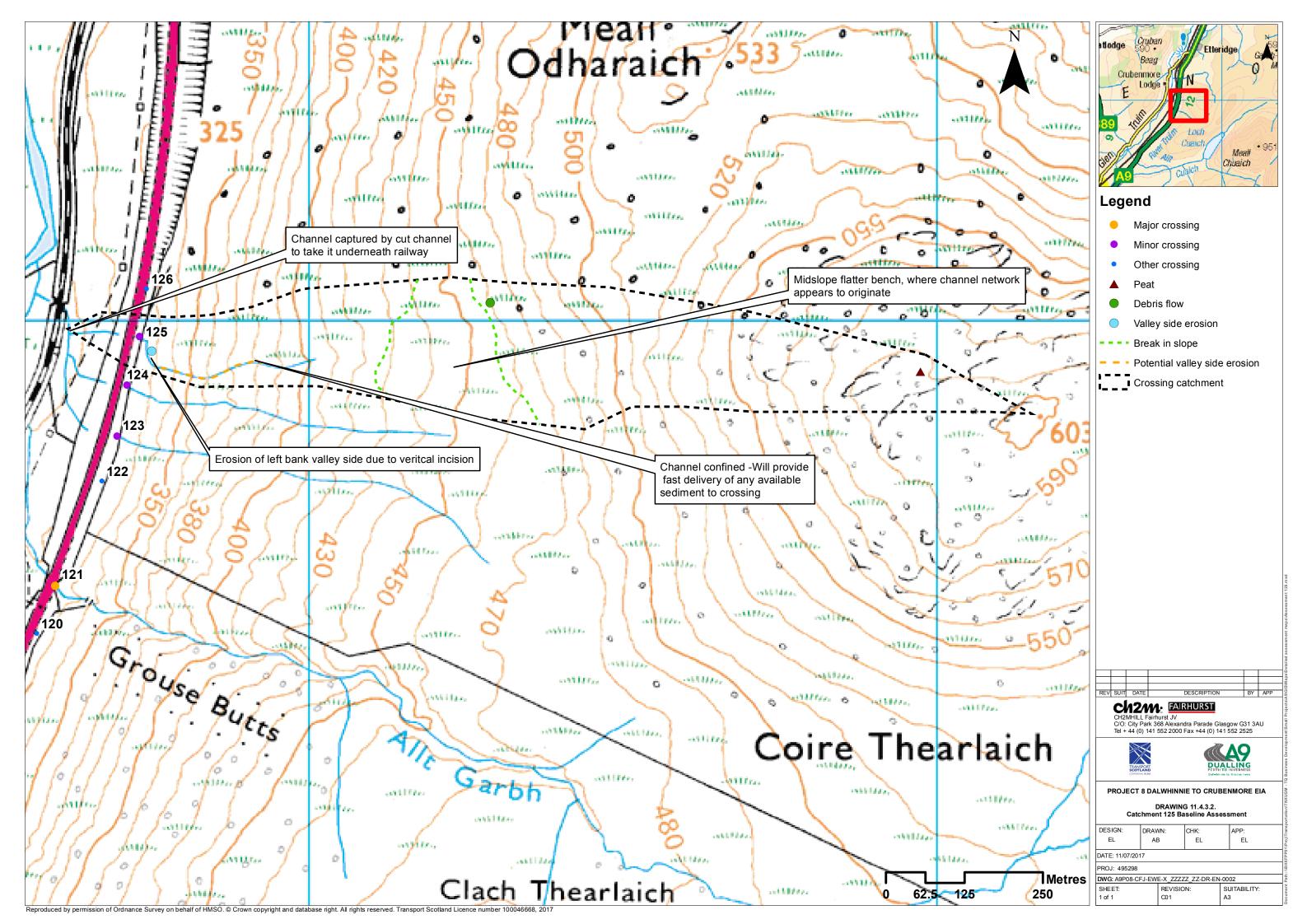
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Catchment No. 126 Catchment Name Natural Nature of water course Channel Nature Size of water course Other No Data Catchment Area (km²) Quantitative Spatial No Data Average slope in catchment (°) Flements % Catchment over 750m (for snow melt risk) No Data Water, flows and levels Good WFD classification Physical condition Good Overall ecological status Moderate Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 126) Gaick Psammite formation-Psammite resistant to weathering, impermeable Geology Is an alluvial fan present at or near the crossing? No nvironmenta No Ramsai designations (see No SAC Drawing 11.4.3.1 c, SPA No Catchment 126) SSSI No See Drawing 11.4.3.2, Catchment 126 Changes in slope and channel confinement Yes Limited thin cover possible in headwater Is peat present in the catchment No Is there a bog burst risk Current valley side or terrace erosion No Potential valley side or terrace erosion No Yes Hill slope failures (including peat slides and debris flows and slides) Not coupled with channels and now vegetated Sediment source and Hill slope failures coupled to channel No upply - Catchment Scale Vertical incision present in catchment No Bank erosion/lateral migration No Unvegetated bars No Wooded/forested areas in catchment No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 126) No Limited. Channel development very limited and no exposed sediment evident. Comment on sediment source potential in catchment Low Comment on sediment supply potential to crossing Cascade Channel morphology Predominant sediment size Gravel Unvegetated bars No Morphology and Process Vertical incision Medium Reach upstream of Deposition Medium crossing Lateral migration/bank erosion Low Presence and nature of infrastructure (Map 1d) No Infrastructure type (see Drawing 11.4.3.1 d, Catchment 126) No No Channel realignment Channel morphology Engineered Predominant sediment size Gravel-cobble Estimated discharge at 1:200 event (m³/s) 2.6 Unvegetated bars None Morphology and Process Vertical incision Low At crossing Deposition Low Lateral migration/bank erosion Low Damaged/unstable drains or armouring Yes Drain armouring appears to have been ripped up Channel morphology Cascade Predominant sediment size Cobble Unvegetated bars No Vertical incision Medium Deposition Low Morphology and Process Lateral migration/bank erosion None Reach downstream of Presence and nature of infrastructure (Map 1d) Yes Railway crossing Flow has to pass through cut drain to get through Infrastructure type (see Drawing 11.4.3.1 d, Catchment 126) Yes railway embankment Drain cut to take flow southwards to join other Channel realignment Yes channels and pass through a crossing in the ailway embankment Only limited channel headwaters u/s of road. Joined by flow from road-parallel drains at crossing. Paving flag armouring appears to have been ripped up and deposited just u/s of culvert. Downstream there is some vertical incision but this might be natural. Cut drain takes flow southwards to join other channels where Summary behaviour gradient reduces, so that flow from several channels passes through just one railway crossing. Where the natural channel ends and cut drain begins, there is a smal fan of coarse material evident in the aerial photos.

| Catchment No. | 127 | | | |
|----------------------|---|-----------------------------------|--------------------------------------|--|
| Catchment Name | - | 1 | | |
| | | | | |
| | Nature of water course | | Drain | |
| Channel Nature | Size of water course | | Other | |
| | | | | |
| Quantitative Spatial | Catchment Area (km ²) | No Data | | |
| Elements | Average slope in catchment (°) | | No Data | |
| Liements | % Catchment over 750m (for snow melt risk) | | No Data | |
| | | | | |
| | Water, flows and levels | Good | | |
| WFD classification | Physical condition | | Good | |
| | Overall ecological status | | Moderate | |
| | | | | |
| | Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 127) | Gaick Psammite formation-Psammite | resistant to weathering, impermeable | |
| Geology | Is an alluvial fan present at or near the crossing? | No | | |

| | | | 1 |
|--------------------------|---|--------------------------------|---|
| Environmental | Ramsar | No | |
| designations (see | SAC | No | |
| Drawing 11.4.3.1 c, | SPA | No | |
| Catchment 127) | SSSI | No | |
| | | | |
| | Changes in slope and channel confinement | See Drawing 1 | 1.4.3.2, Catchment 127 |
| | Is peat present in the catchment | Yes | Small possible deposit in upper catchment |
| | Is there a bog burst risk | No | |
| | Current valley side or terrace erosion | No | |
| | Potential valley side or terrace erosion | No | |
| | Hill slope failures (including peat slides and debris flows and slides) | Yes | Not coupled with channels and now vegetated |
| Sediment source and | Hill slope failures coupled to channel | No | |
| supply - Catchment Scale | Vertical incision present in catchment | No | |
| | Bank erosion/lateral migration | No | |
| | Unvegetated bars | No | |
| | Wooded/forested areas in catchment | No | |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 127) | No | |
| | Comment on sediment source potential in catchment | Looks limited. Some possible s | hallow translational (peat?) failure scars |
| | Comment on sediment supply potential to crossing | | Limited |

| | Channel morphology | Engineered | Channel starts as two drains above cutting which capture hillslope drainage and bring them to a cascade, which descends the cutting to road level, where the flow enters a road parallel drain for c.160m. |
|-------------------------|---|------------|--|
| | Predominant sediment size | - | no sediment present in road-parallel drain |
| Morphology and Process- | Unvegetated bars | No | |
| Reach upstream of | Vertical incision | None | |
| | Deposition | None | |
| crossing | Lateral migration/bank erosion | None | |
| | Presence and nature of infrastructure (Map 1d) | Cascade | c. 160m south of crossing |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 127) | No | |
| | Channel realignment | Yes | Natural channel appears to have been present here on 1902 six inch map, but road cutting has cut off the channel's headwaters. |

| | Channel morphology | Engineered | |
|-------------------------|--|------------|--|
| | Predominant sediment size | Gravels | |
| | Estimated discharge at 1:200 event (m ³ /s) | 2.6 | |
| | Unvegetated bars | No | |
| Morphology and Process- | Vertical incision | None | |
| At crossing | Deposition | Low | Some deposition of gravel in catch pit and in |
| | Deposition | EOW | culvert. |
| | Lateral migration/bank erosion | None | |
| | Damaged/unstable drains or armouring | Yes | At cascade further up there is limited damage - dislodging of blocks. |

| | Channel morphology | Plane bed | |
|-------------------------|---|--------------|---|
| | Predominant sediment size | None visible | |
| | Unvegetated bars | No | |
| | Vertical incision | Medium | Possible scour pool visible in aerial photo |
| Morphology and Process- | Deposition | Low | |
| Reach downstream of | Lateral migration/bank erosion | Medium | Possible scour pool visible in aerial photo |
| crossing | Presence and nature of infrastructure (Map 1d) | Yes | Railway |
| crossing | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 127) | Yes | Channel restricted in route it can follow to pass under railway crossing c.70m d/s of culvert exit |
| | Channel realignment | No | Channel appears to be in original place d/s of road |

Summary behaviou

Headwaters of original channel have been removed by the cutting through which the road runs. Drainage is now captured above cutting by cross-slope drains which actually drop to road level via a cascade which descends the cutting 160m to the south of the crossing. The channel turns abruptly to the north once at road level and flows northwards to crossing 127. At the u/s end of the culvert (in the catch pit) and within the culvert there is a small amount of small gravel deposited. D/s of the culvert, the channel seems to follow it's original alignment, but the aerial photos indicate a possible scour pool where engineering measures stop. D/s of this, c. 70m d/s of the road crossing, the channel passes under the railway. Possible opportunity to remove some of the sharp unnatural turns in the channel.

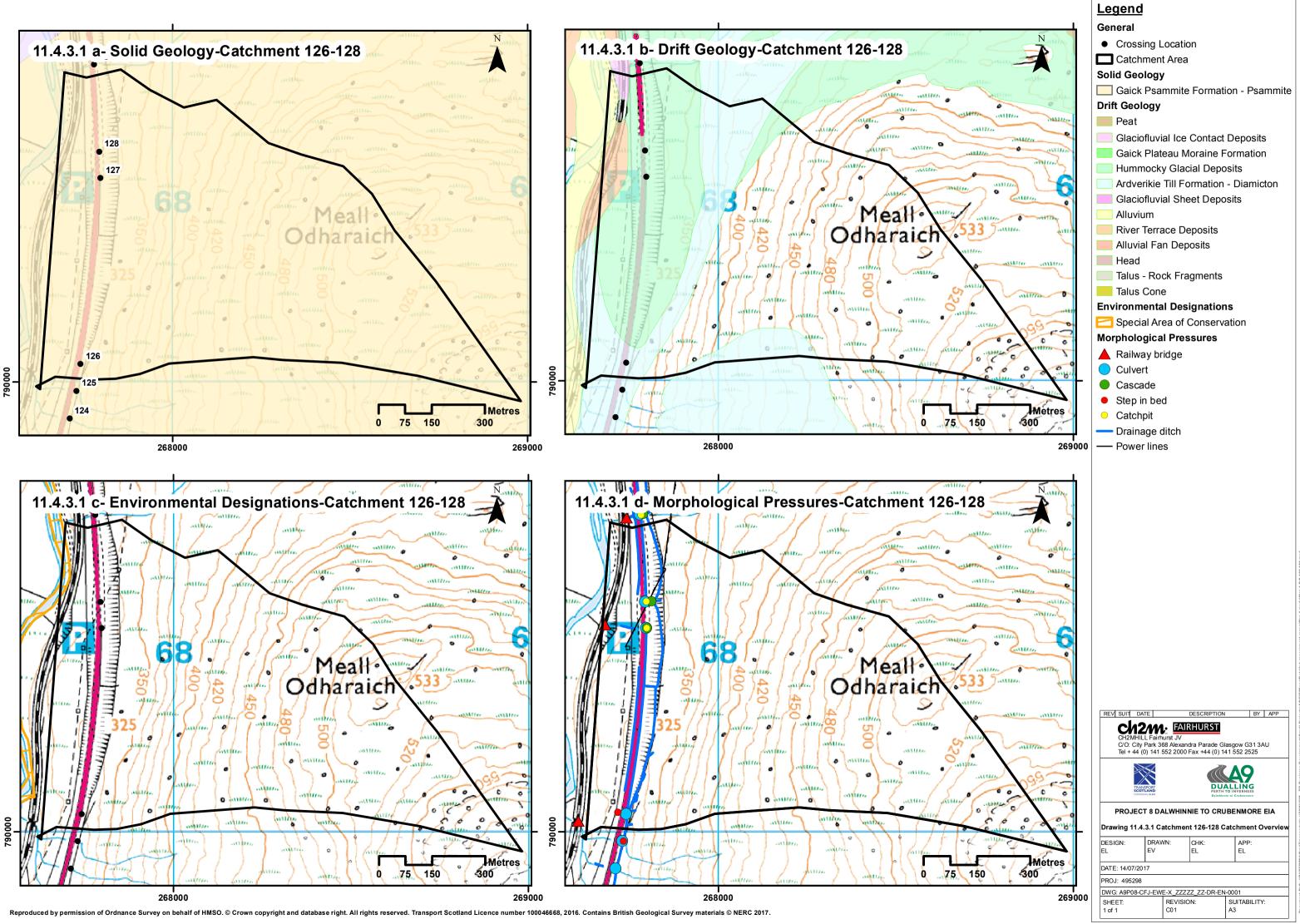
| Catchment No. Catchment Name | 128 | | |
|--|--|---|---|
| | | a 1 | Network |
| Channel Nature | Nature of water course | | Natural |
| | Size of water course | | Other |
| | Catchment Area (km²) | | No Data |
| Quantitative Spatial | Average slope in catchment (°) | | No Data |
| Elements | % Catchment over 750m (for snow melt risk) | | No Data |
| | | 1 | |
| WFD classification | Water, flows and levels Physical condition | | Good |
| WPD classification | Overall ecological status | | Good Moderate |
| | | L. | |
| | Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 128) | Gaick Psammite formation-Psammite | resistant to weathering, impermeable |
| Geology | Is an alluvial fan present at or near the crossing? | No | |
| | | | |
| | Ramsar | No | |
| Environmental designations (see | SAC | No | |
| Drawing 11.4.3.1 c, | | | |
| Catchment 128) | SPA | No | |
| | SSSI | No | |
| | Changes in slope and channel confinement | See Drawing | 11.4.3.2, Catchment 128 |
| | | See Drawing | |
| | Is peat present in the catchment | Yes | Small possible deposit in upper catchment |
| | Is there a bog burst risk | No | |
| | Current valley side or terrace erosion | No | |
| 6 | Potential valley side or terrace erosion | No | |
| Sediment source and supply - Catchment | Hill slope failures (including peat slides and debris flows and slides) | Yes | Not coupled with channels and now vegetated |
| Scale | Hill slope failures coupled to channel | No | |
| | Vertical incision present in catchment | No | |
| | Bank erosion/lateral migration Unvegetated bars | No No | |
| | Wooded/forested areas in catchment | No | |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) | No | |
| | Comment on sediment source potential in catchment | | Limited |
| | Comment on sediment supply potential to crossing | Limited - seems to | be little sediment in catch pit |
| | Channel morphology | Engineered | Drains and cascade |
| | Predominant sediment size | Angular large gravel/small cobble | Generated from damage to cascade |
| | Unvegetated bars | No | |
| Morphology and Process | Vertical incision Deposition | None Low | |
| Reach upstream of | | None | |
| | Lateral migration/bank erosion | NOTE | |
| crossing | Lateral migration/bank erosion Presence and nature of infrastructure (Map 1d) | Yes | Cascade |
| crossing | | | Generating sediment, limiting energy reaching |
| crossing | Presence and nature of infrastructure (Map 1d) | Yes | Generating sediment, limiting energy reaching crossing. |
| crossing | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) | Yes Yes | Generating sediment, limiting energy reaching |
| crossing | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology | Yes Yes Yes Engineered | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert |
| crossing | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size | Yes Yes Yes Engineered Gravel | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned |
| | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated base | Yes Yes Yes Engineered | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated base | Yes Yes Engineered Gravel 2.6 | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert |
| | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition | Yes Yes Engineered Gravel 2.6 No None Low | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion | Yes Yes Engineered Gravel 2.6 No None Low None | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition | Yes Yes Engineered Gravel 2.6 No None Low | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion Damaged/unstable drains or armouring | Yes Yes Engineered Gravel 2.6 Non Low None Low Yes | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit Limited damage to cascade steps producing coarse angular material |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion Damaged/unstable drains or armouring Channel morphology | Yes Yes Engineered Gravel 2.6 No None Low None Yes Engineered | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit Limited damage to cascade steps producing |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion Damaged/unstable drains or armouring Channel morphology Predominant sediment size | Yes Yes Engineered Gravel 2.6 Non Low None Low Yes | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit Limited damage to cascade steps producing coarse angular material |
| Morphology and Process At crossing | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion Damaged/unstable drains or armouring Channel morphology Predominant sediment size Unvegetated bars Vertical incision | Yes Yes Engineered Gravel 2.6 No None Low None Yes Engineered Fine No No | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit Limited damage to cascade steps producing coarse angular material |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Damaged/unstable drains or armouring Channel morphology Predominant sediment size Unvegetated bars Vertical incision Deposition Deposition | Yes Yes Engineered Gravel 2.6 No Low Low Yes Engineered Fine No None Low | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit Limited damage to cascade steps producing coarse angular material |
| Morphology and Process At crossing Morphology and Process | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 128) Channel realignment Channel morphology Predominant sediment size Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion Damaged/unstable drains or armouring Channel morphology Predominant sediment size Unvegetated bars Vertical incision Deposition Lateral migration/bank erosion | Yes Yes Engineered Gravel 2.6 None Low None Yes Engineered Fine No None Low Yes | Generating sediment, limiting energy reaching crossing. In cutting so must have been realigned Pipe culvert accumulated in catch pit Limited damage to cascade steps producing coarse angular material Cut drain Fines and organics only. Sluggish |
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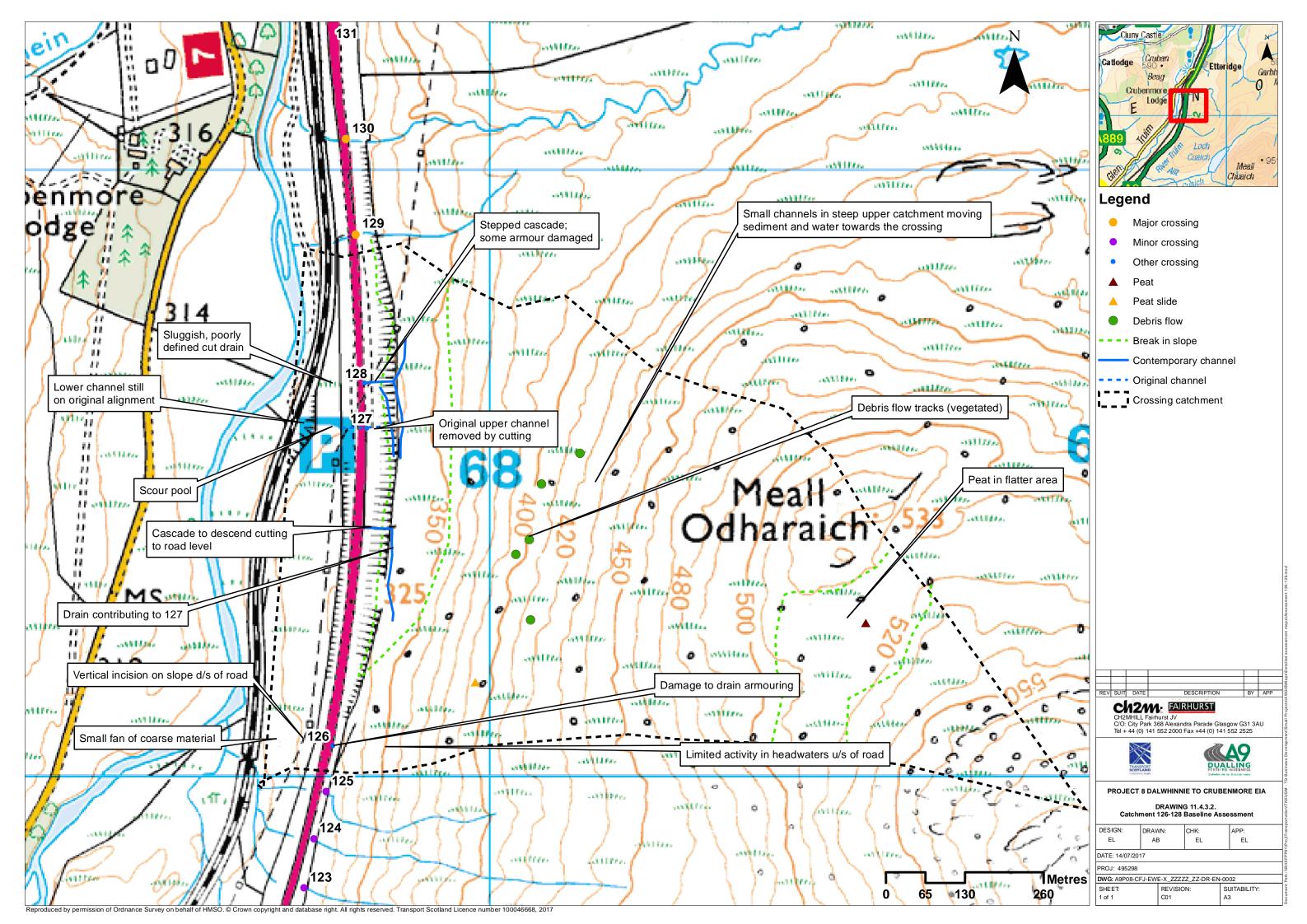


Photograph 11.4.3.124- Cascade upstream of crossing



Photograph 11.4.3.125-Downstream- low slope and unconstrained channel





| distance is: 10 Construction: Name at none: Name at noe none: Name at noe: <t< th=""><th></th><th>Annex 11.4.3 - Hydromorphologica</th><th></th><th></th></t<> | | Annex 11.4.3 - Hydromorphologica | | |
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| Gening/ tape allocating present at or near the occupy ² No Developmental designation teer provincemental designation teer designation teer designated teer designation teer designation teer designation | | Overall ecological status | | Moderate |
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| SSI No Inclusion Self and the state in the definition of the state in the definint of the sta | | CDA | No | NB only at confluence with the Truim |
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| Morphology and Process- Vertical incision None At crossing Vertical incision None Deposition None Integrated bars Lateral migration/bank erosion None Damaged/unsable drains or armouring None Channel morphology Plane bed Predominant sediment size Cobble (angular) Unvegetated bars No Vertical incision Low Deposition Low Integrated bars No Vertical incision Low Deposition Low Lateral migration/bank erosion None Reach downstream of crossing Presence and nature of infrastructure (Map 1d) Yes Presence and nature of infrastructure (Map 1d) Yes Fence retaining debris us or alway crossing. Plus fence retaining debris us or alway crossing. Infrastructure type (see Drawing 11.4.3.1 d, Catchment 129) Yes Channel ikely to be in original position d/s of road arailway, but not shown on historic maps. Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris build-up u/s of the crossing. D/s of the | | Predominant sediment size | None | |
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| Morphology and Process- Reach downstream of crossing Low Image: Complexity of the construction of the constru | | Unvegetated bars | No | |
| Morphology and Process- Reach downstream of crossing Interaction (application) bank erosion None Railway and associated cascade and bank retention/protection (gabion baskets). Plus engineered bed at railway crossing. Plus fence retaining debris u/s of railway Infrastructure type (see Drawing 11.4.3.1 d, Catchment 129) Yes Fence retaining debris u/s of railway condition and as well as possibly creating step. In poor condition and as well as possibly creating step. In poor condition and as well as possibly creating debris to railway crossing. Channel realignment No Channel likely to be in original position d/s of road and railway, but not shown on historic maps. Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris build-up u/s of the crossing. D/s of the crossing, there appears to be a mobile bed of coarse angular sediment, increasingly coarse towards railway be maplaced specifically. D/s of the crossing, there is a low wooden dam and fence which is retaining debris. This is in jon condition and could release this may be emplaced specifically. D/s of the road there is a low wooden dam and fence which is retaining debris. This is in yoor condition and could release this may be emplaced specifically. D/s of the crossing. The fall from the road to the railway is very steep and straight and will have high levels of energy | | | | |
| Morphology and Process- Reach downstream of crossing resence and nature of infrastructure (Map 1d) Yes retention/protection (gabion baskets). Plus engineered bed at railway crossing. Plus fence retaining debris u/s of railway Infrastructure type (see Drawing 11.4.3.1 d, Catchment 129) Yes Fence retaining debris u/s of railway crossing. Infrastructure type (see Drawing 11.4.3.1 d, Catchment 129) Yes Fence retaining debris u/s of railway crossing. Channel realignment No Channel is not urb of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris build-up u/s of the crossing. D/s of the crossing, there appears to be a nowble bed crosse angular sediment, increasingly coarse towards railway bridge although this may be emplaced specifically. D/s of the crossing. There as a low wooden dam and fence which is retaining debris. This is in por condition and could release diment subter which is retaining debris. This is in on condition and could release this may be emplaced specifically. D/s of the road there is a low wooden dam and fence which is retaining debris. This is in por condition and could release diment suddent if it flats and cause an u/s wave of erosion. The fall from the road to the railway is very steep and straight and will have high levels of energy | | | | |
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| Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris condition and as well as possibly creating nick point, this structure may fail, delivering debris to railway crossing. Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris to the railway crossing behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris to the railway the match and could release und and and mange the railway to the road there is and there which is retaining debris. This is in por condition and could release the railway were of ensoin. The fall from the road to the railway is very steep and straight and will have high levels of energy | | | | retaining debris u/s of railway |
| Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris | | | | |
| Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris build-up u/s of the crossing, D/s of the crossing, there appears to be a mobile bed of coarse angular sediment, increasingly coarse towards railway bridge although Summary behaviour channel is natural u/s of or od cutting, but descends road turting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris | | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 129) | Yes | point, this structure may fail, delivering debris to |
| Channel realignment No road and railway, but not shown on historic maps. Summary behaviour Channel is natural u/s of road cutting, but descends road cutting via a cascade cut into the bedrock. This seems to be operating effectively and there is no debris build-up u/s of the crossing. D/s of the crossing, there appears to be a mobile bed of coarse angular sediment, increasingly coarse towards railway bridge although this may be emplaced specifically. D/s of the crossing. There is a low wooden dam and fence which is retaining debris. This is in poor condition and could release diment suddement, increasingly tand will have high levels of energy | | | | |
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| Summary behaviour build-up u/s of the crossing. D/s of the crossing, there appears to be a mobile bed of coarse angular sediment, increasingly coarse towards railway bridge although this may be emplaced specifically. D/s of the road there is a low wooden dam and fence which is retaining debris. This is in poor condition and could release sediment suddenly if it fails and cause an u/s wave of erosion. The fall from the road to the railway is very steep and straight and will have high levels of energy | | | | maps. |
| Summary behaviour build-up u/s of the crossing. D/s of the crossing, there appears to be a mobile bed of coarse angular sediment, increasingly coarse towards railway bridge although this may be emplaced specifically. D/s of the road there is a low wooden dam and fence which is retaining debris. This is in poor condition and could release sediment suddenly if it fails and cause an u/s wave of erosion. The fall from the road to the railway is very steep and straight and will have high levels of energy | | | | |
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| | Summary behaviour | this may be emplaced specifically. D/s of the road there is a low w | ooden dam and fence which is retaining de | ebris. This is in poor condition and could release |
| which need to be designed for in dry new clossings. | | | | ep and straight and will have high levels of energy |
| | | which hed to | Brice for in any new crossings. | |
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Photograph 11.4.3.126-Downstream

Crossing exit

Railway

crossing

Debris build up behind fence creating a step in the channel

Photograph 11.4.3.127-Upstream



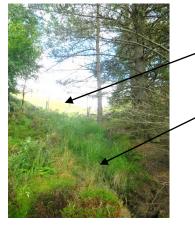
Photograph 11.4.3.129



Photograph 11.4.3.128-Upstream

Cascade upstream of railway

crossing



Photograph 11.4.3.130-Upstream embankment



Photograph 11.4.3.132-Downstream to catchpit

Moorland catchment

Steep channel gradient Cascade

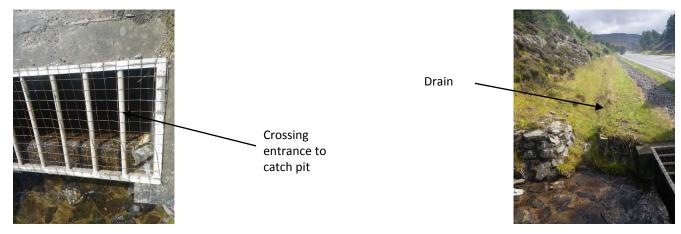


Photograph 11.4.3.131-Looking down embankment

Bedrock cascade down embankment

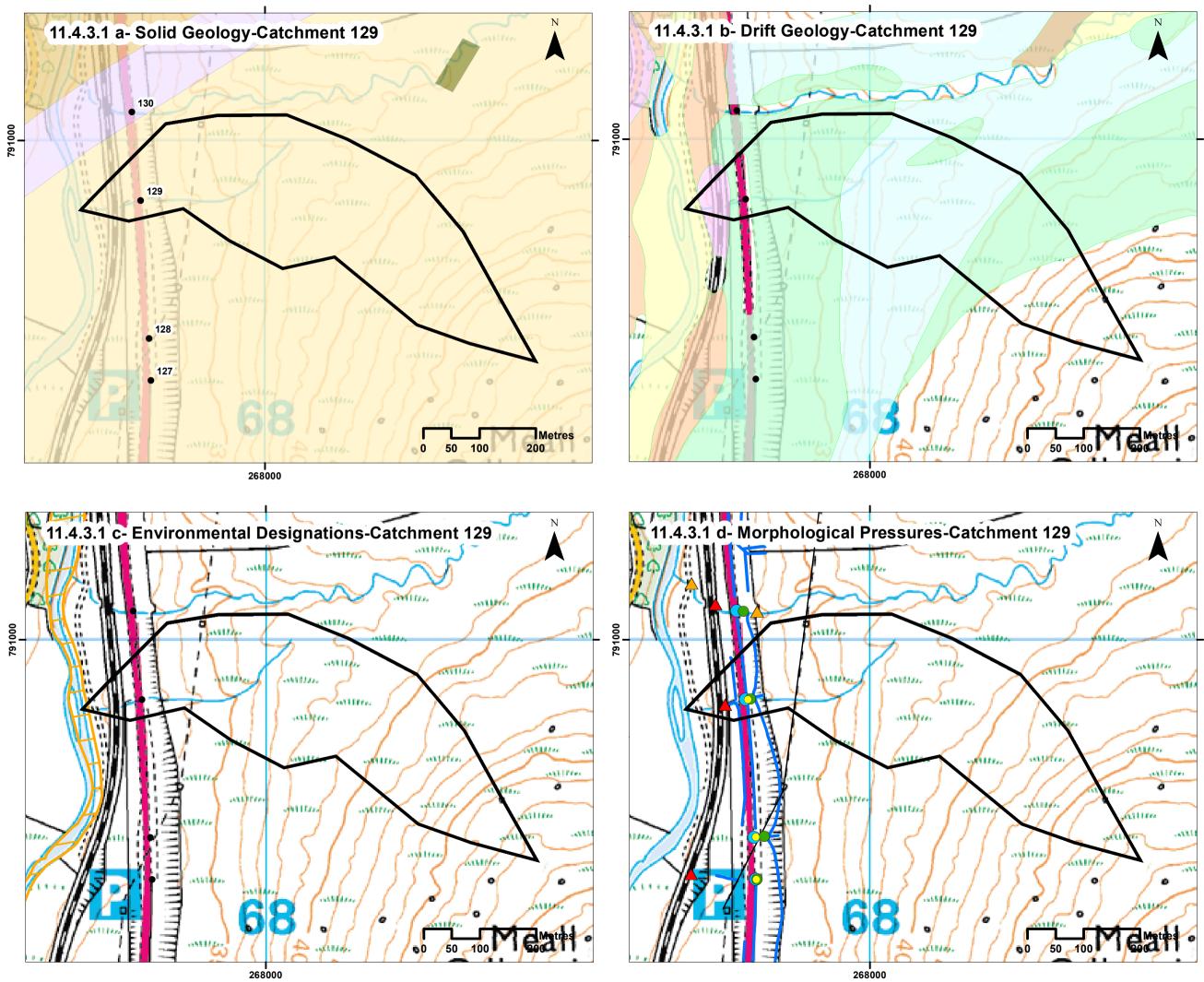


Photograph 11.4.3.133



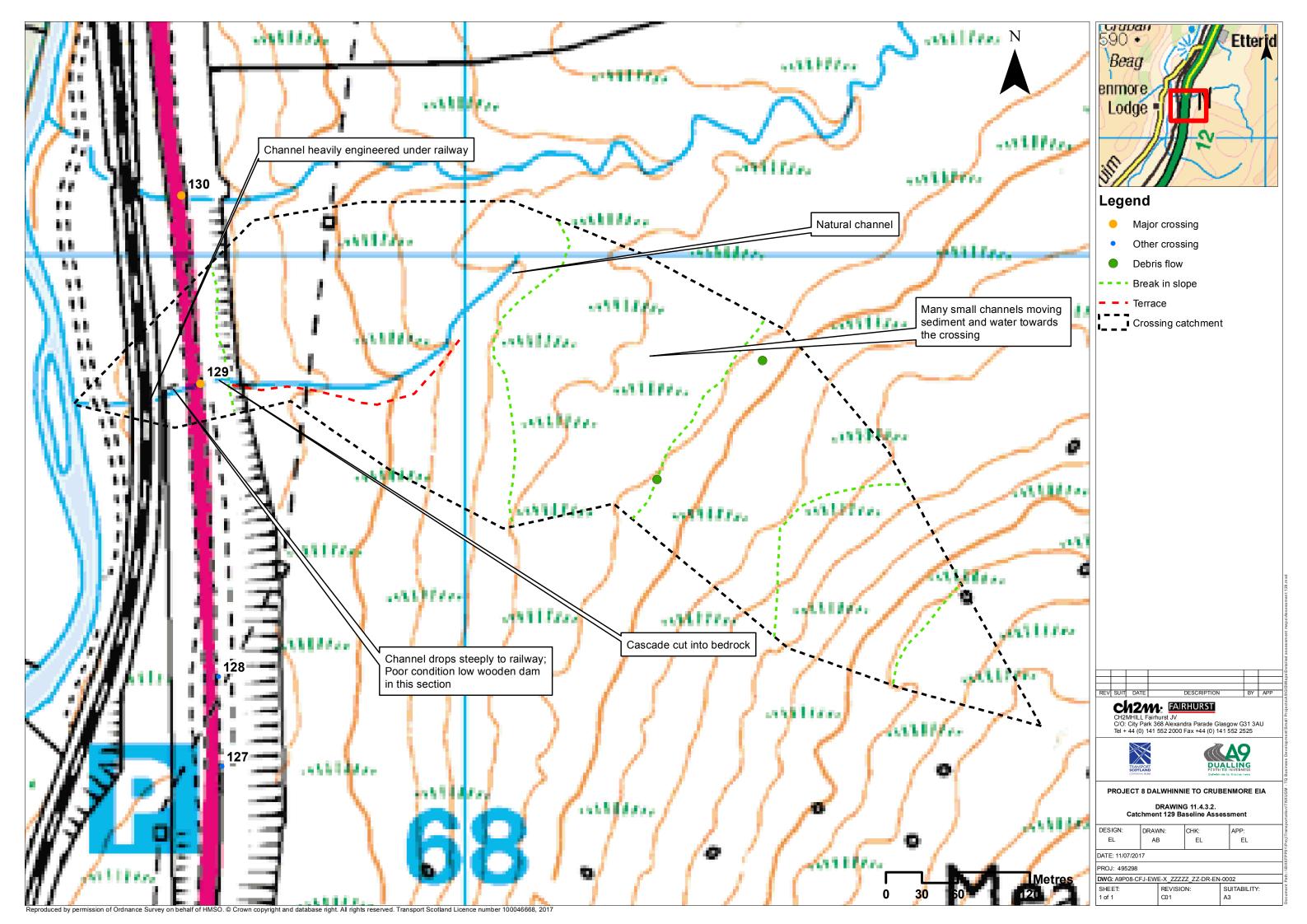
Photograph 11.4.3.134

Photograph 11.4.3.135



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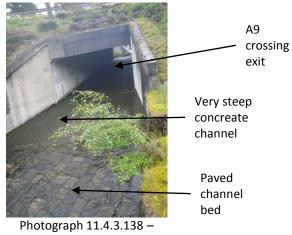
| | Legend |
|---|--|
| | - |
| | General |
| | Crossing location |
| | - |
| | Solid Geology |
| | Gaick Psammite Formation - Psammite |
| | |
| | Drift Geology |
| | Peat |
| | Glaciofluvial Ice Contact Deposits |
| | - |
| _ | Gaick Plateau Moraine Formation |
| | Hummocky Glacial Deposits |
| | Ardverikie Till Formation - Diamicton |
| | |
| | Glaciofluvial Sheet Deposits |
| | Alluvium |
| | |
| | River Terrace Deposits |
| | Alluvial Fan Deposits |
| | Head |
| | |
| | Talus - Rock Fragments |
| | Talus Cone |
| | |
| | Environmental Designations |
| | Special Area of Conservation |
| | |
| | Morphological Pressures |
| | 🔺 Railway Bridge |
| | Track/Footbridge |
| | - |
| | Culvert |
| | Cascade |
| | |
| | Catchpit |
| | Drainage Ditch |
| | - Power Lines |
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| _ | CH2MHILL Fairburst JV CYC City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Image: Construction of the second secon |
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| | CH2MHILL Fairburst JV C/22MHILL Fairburst JV C/02 City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Image: Comparison of the second secon |
| | CH2MHILL Fairburst JV CYC City Park 368 Alexandra Parade Glasgow G31 3AU Tel + 44 (0) 141 552 2000 Fax +44 (0) 141 552 2525 Image: Construction of the state o |



| Catchment No. | 130 | I | |
|--|---|---|--|
| Catchment Name | Allt na Ceàrdaich (Allt a' Mhill Odharaich in upper catchment) | 1 | |
| Channel Nature | Nature of water course | | Natural |
| channel Nature | Size of water course | | Major |
| | Catchment Area (km ²) | | 3.3 |
| Quantitative Spatial Elements | Average slope in catchment (°) | | 7.5 |
| | % Catchment over 750m (for snow melt risk) | | 0 |
| WFD classification | Water, flows and levels Physical condition | | Good Good |
| WPD classification | Overall ecological status | | Moderate |
| | Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 130) | Gaick Psammite formation-Psammite | resistant to weathering, impermeable |
| Geology | Is an alluvial fan present at or near the crossing? | No | resistant to weathering, impermeasie |
| Environmental | Ramsar | No | |
| designations (see | SAC | No | |
| Drawing 11.4.3.1 c, Catchment 130) | SSSI | No No | |
| | Changes in slope and channel confinement | See Drawing | 11.4.3.2, Catchment 130 |
| | Is peat present in the catchment | Yes | |
| | Is there a bog burst risk | Yes | But low as possible peaty areas are valley mires |
| | Current valley side or terrace erosion | Yes | Mostly revegetated but not wholly unrecent. |
| | Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) | Yes | Throughout terraced section. C. 400m Not coupled |
| | Hill slope failures coupled to channel Vertical incision present in catchment | No Yes | |
| Sediment source and | Bank erosion/lateral migration | Yes | In incised gorge In incised gorge |
| supply - Catchment Scale | Unvegetated bars | Yes | There are some, but they are limited in number and extent to lower catchment |
| Scale | Wooded/forested areas in catchment | Yes | Some trees near channel u/s of road. More |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 130) | Yes | wooded d/s of railway Wooden bridge |
| | Comment on sediment source potential in catchment | High - In terraced section, outsides of b | ends are eroding the valley side, likely to produce |
| | Comment on sediment supply potential to crossing | High - some sediment may be deposited | arious grades from till slopes. if eroded from valley sides, but this is likely to be ngly steep channel (as far as road and railway |
| | | | mobilised is transported to Truim main valley. Steep natural cascade channel. Waterfall noted |
| | Channel morphology | Cascade | on historic maps, but likely to have been modified to be even steeper bedrock cascade when road cutting constructed |
| | Predominant sediment size Unvegetated bars | Gravel-Cobble and bedrock No | |
| Morphology and Process | Vertical incision Deposition | Medium Low | |
| Morphology and Process- Reach upstream of | Lateral migration/bank erosion | Low | |
| crossing | Presence and nature of infrastructure (Map 1d) Infrastructure type (see Drawing 11.4.3.1 d, Catchment 130) | Yes | Wooden bridge Bridge in poor condition, but seems to be well above channel so not influencing. If collapses, |
| | Channel realignment | Yes | could lead to debris dam. Possibly some vertical realignment with construction of crossing, but channel probably |
| | | | follows same plan/horizontal alignment. |
| | Channel morphology | Engineered | Concrete bed. Very steep, spillway-like |
| | Predominant sediment size | None visible 10.4 | |
| Morphology and Process- | Estimated discharge at 1:200 event (m ³ /s) Unvegetated bars | No | |
| At crossing | Vertical incision Deposition | None None | |
| | Lateral migration/bank erosion | None | |
| | Damaged/unstable drains or armouring | No | Seems to be in good condition |
| | Channel morphology | Engineered | Engineered to d/s of railway, then becomes plane bed |
| | Predominant sediment size | - | |
| | Unvegetated bars Vertical incision | Yes | D/s of railway Difficult to see d/s of railway |
| | Deposition | Low | Difficult to see d/s of railway |
| Morphology and Process- | Lateral migration/bank erosion Presence and nature of infrastructure (Map 1d) | Low Yes | Difficult to see d/s of railway Railway |
| Reach downstream of crossing | Infrastructure type (see Drawing 11.4.3.1 d, Catchment 130) | Yes | Very limited options for realignment as short distance and steep between road and railway |
| | Channel realignment | No | D/s of road the channel seems to be on original alignment. Although the georeferenced historic maps indicates there is an offset, this is unlikely to be real as it also occurs in the unaltered natural channel well u/s of the road. |
| Summary behaviour | Channel rises c. 3.5km u/s of crossing in Coire Mill Odharaich and fall D/s of this, the channel enters a wandering section where incision ha Truim main valley. In this section the outsides of the meander bends to the channel. This sediment is likely to be easily transported in deposition before the crossing as the channel nears the main Truim under the road is very steep still, as is the engineered bed under th crossing, but this is not possible to tell from either set of field photog looks to see the nature of the channel and deposition to undersi Suggest careful design is needed to ensure sediment is efficiently trans- | as occurred (probably over Holocene time are eroding the valley sides which have t flood conditions as the channel steepens i valley. Little deposition is evident at the e railway immediately d/s. It is possible t raphs or aerials due to tree cover. Sugges tand the actual sediment delivery to the I | scale) possibly in response to down cutting in the he potential to deliver large amounts of sediment and straightens with limited opportunities for crossing and the engineered bed of the crossing hat the channel is quite active d/s of the railway t further inspection checks this side of the railway owest reaches of this channel and the Truim. |



Photograph 11.4.3.136



Upstream to crossing exit

Bedrock fall

Paved channel bed

Railway

crossing

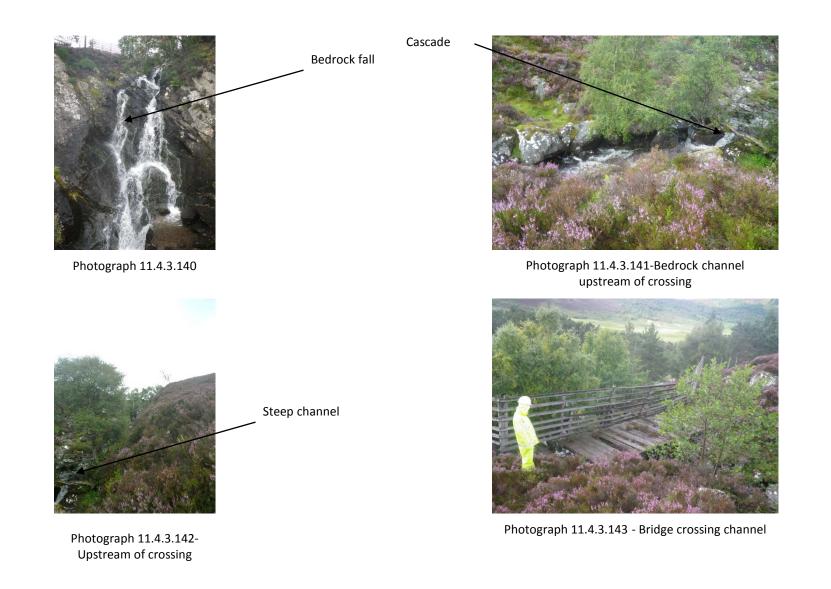


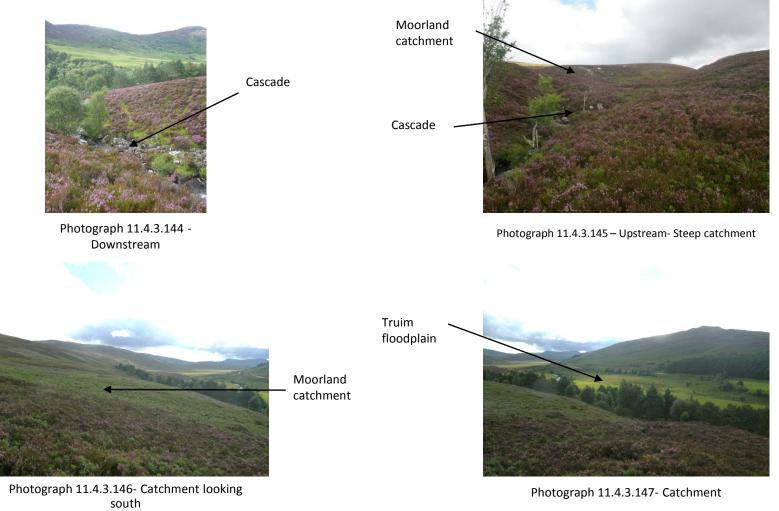
Photograph 11.4.3.137 - Downstream

Railway crossing

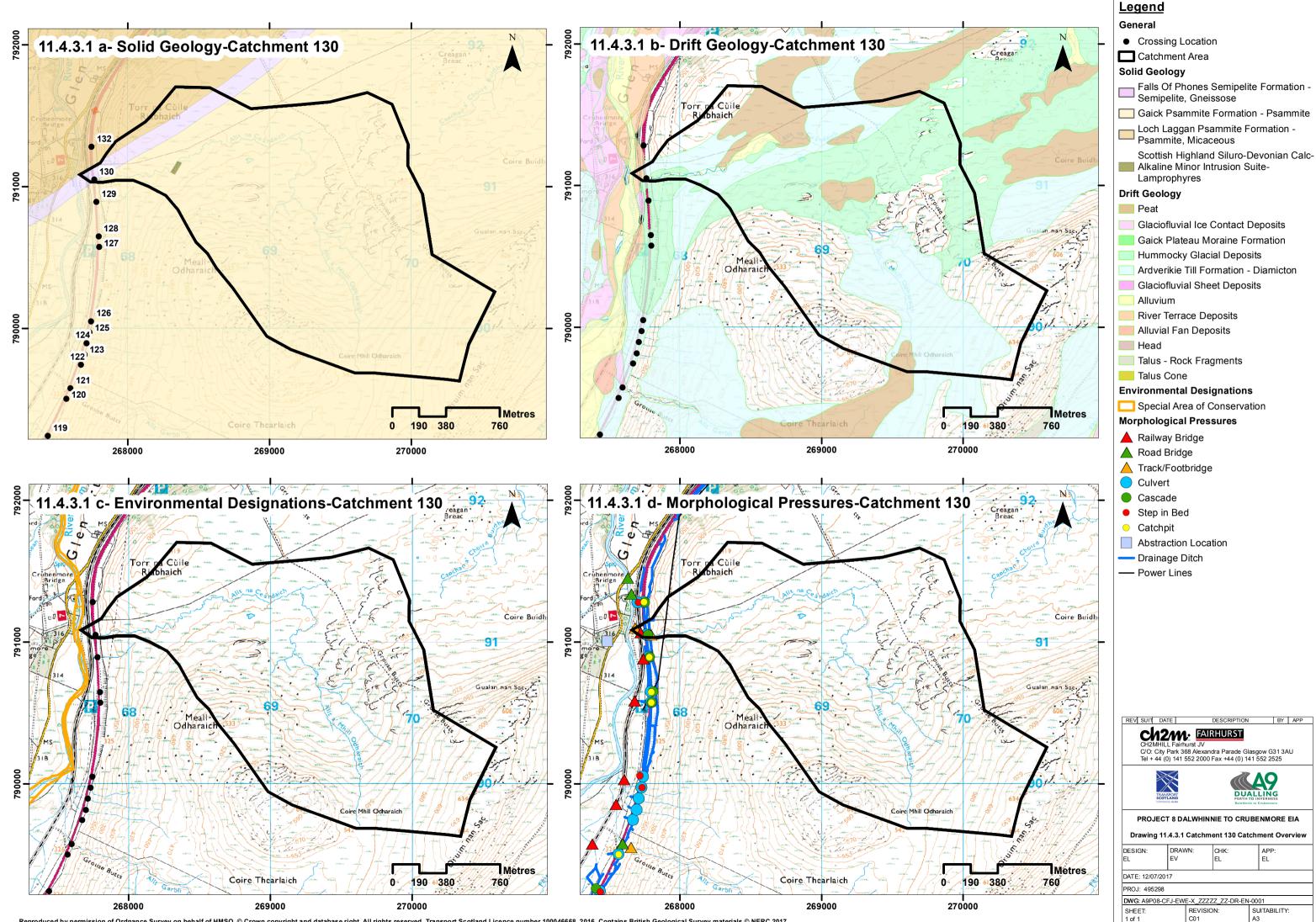


Photograph 11.4.3.139 -Downstream under railway crossing

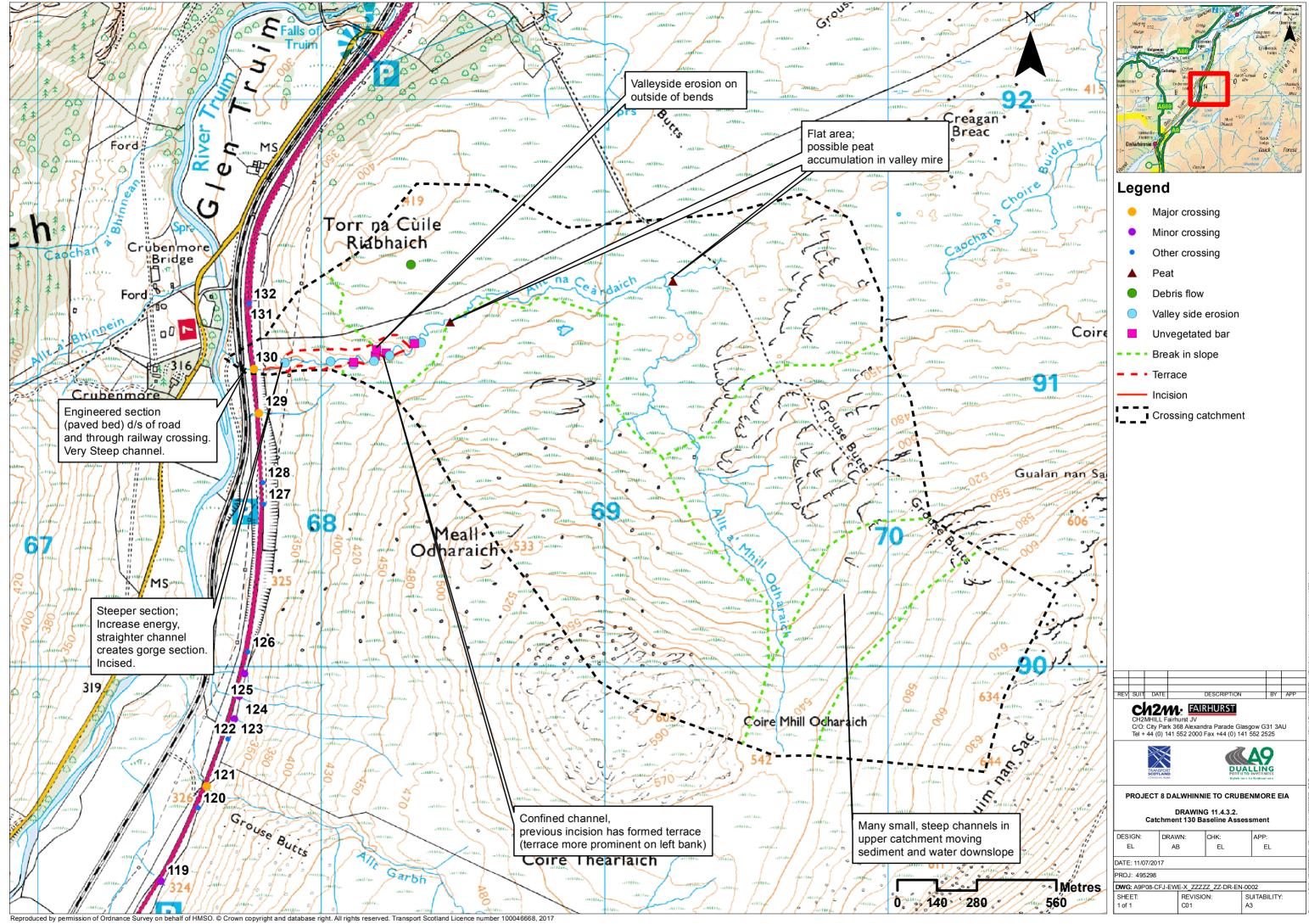




Photograph 11.4.3.147- Catchment



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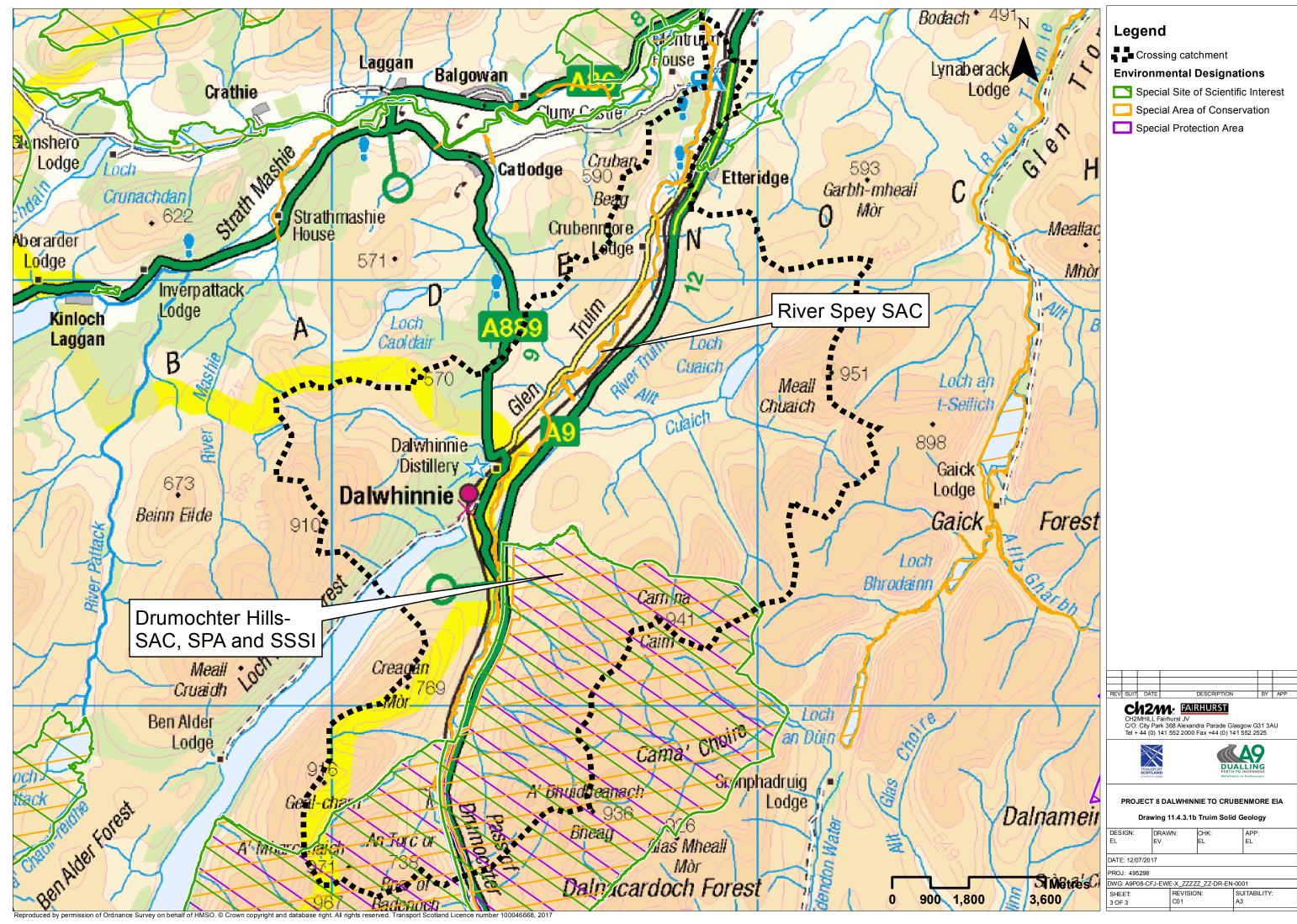
| Catchment No. | | 1 | |
|---|---|---|---|
| Catchment Name | Truim | | |
| caterinent Hame | 1 | 4 | |
| | Nature of water course | | Natural |
| Channel Nature | Size of water course | | Major |
| | Size of water course | | Wajoi |
| | - | | |
| Quantitative Spatial | Catchment Area (km ²) | | 131 |
| Elements | Average slope in catchment (°) | | |
| | % Catchment over 750m (for snow melt risk) | | |
| - | | | |
| WFD classification | Water, flows and levels | | Good |
| WPD classification | Physical condition | | Good |
| | Overall ecological status | Good (River Truim from source to Alit | Cuaich) Moderate (River Truim-lower catchment) |
| | Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment Truim) | Gaick Psammite formation-Psammite | resistant to weathering, impermeable |
| Geology | | | resistant to weathering, impermeable |
| Geology | Is an alluvial fan present at or near the crossing? | N/A | |
| | | | |
| | Domeor | No | |
| | Ramsar | No | |
| | | | Drumochter Hills - Acidic scree, alpine and |
| | | | subalpine heaths, blanket bog, dry heaths, |
| | | | montane acid grasslands , mountain willow scrub, |
| | | | plants in crevices on acid rocks, species-rich |
| | SAC | Yes | grassland with mat-grass in upland areas, tall herb |
| Environmental | | | communities, wet heathland with cross-leaved heath. |
| designations (see | | | neath. |
| Drawing 11.4.3.1 c, Catchment Truim) | | | River Spey - Atlantic salmon, freshwater pearl |
| Catchinent fruini) | | | mussel, otter, sea lamprey |
| | CD4 | ¥ | Drumochter Hills - Dotterel breeding, merlin |
| | SPA | Yes | breeding |
| | | | Development of the second |
| | | | |
| | SSSI | Yes | Drumochter Hills - Breeding bird assemblage, fluvial geomorphology of Scotland, montane |
| | SSSI | Yes | fluvial geomorphology of Scotland, montane |
| | SSSI | Yes | |
| | | | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage |
| | SSSI Changes in slope and channel confinement | | fluvial geomorphology of Scotland, montane |
| | | | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage |
| | Changes in slope and channel confinement | See Drawing 1: | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage |
| | Changes in slope and channel confinement Is peat present in the catchment | See Drawing 1: Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk | See Drawing 1: Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion | See Drawing 1 Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk | See Drawing 1: Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion | See Drawing 1 Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on |
| Sediment source and | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion | See Drawing 1: Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim |
| Sediment source and | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion | See Drawing 1: Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on |
| Sediment source and supply - Catchment Scale | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel | See Drawing 1: Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) | See Drawing 1: Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on the Truim |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Uthin catchment, but not with a direct impact on the Truim Currently impacting on the road |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Urvegetated bars | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on the Truim Currently impacting on the road Through main channel |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Uvregetated bars Wooded/forested areas in catchment | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Uthin catchment, but not with a direct impact on the Truim Currently impacting on the road |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Urvegetated bars | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on the Truim Currently impacting on the road Through main channel thin the Truim catchment, fro the steep slopes and |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Uvregetated bars Wooded/forested areas in catchment | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes There are extensive sediment sources wi these are delivered to the Truim from th reduced getting to the Truim form th | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Within catchment, but not with a direct impact on the Truim Currently impacting on the road Through main channel thin the Truim catchment, fro the steep slopes and e steep tributaries. Some of this supply is currently |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Uvregetated bars Wooded/forested areas in catchment | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes There are extensive sediment sources wi these are delivered to the Truim from th reduced getting to the Truim form th | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Uvregetated bars Wooded/forested areas in catchment | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes There are extensive sediment sources wi these are delivered to the Truim from th reduced getting to the Truim form th | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Unvegetated bars Wooded/forested areas in catchment Infrastructure type (see Drawing 11.4.3.1 d, Catchment Truim) | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes There are extensive sediment sources wi these are delivered to the Truim from th reduced getting to the Truim by the under and by the SSE a | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim I.4.3.2, Catchment Truim Within catchment, but not with a direct impact on the Truim Currently impacting on the road Through main channel thin the Truim catchment, fro the steep slopes and e steep tributaries. Some of this supply is currently rsized culverts, catchment pits etc. that form the A9, and Hydro power scheme. Varied channel form and process, typical of the |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Urvegetated bars Wooded/forested areas in catchment Infrastructure type (see Drawing 11.4.3.1 d, Catchment Truim) Channel morphology | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes There are extensive sediment sources wi these are delivered to the Truim from th reduced getting to the Truim by the under and by the SSE in Wandering | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Utility of the second structure of the second scotle |
| | Changes in slope and channel confinement Is peat present in the catchment Is there a bog burst risk Current valley side or terrace erosion Potential valley side or terrace erosion Hill slope failures (including peat slides and debris flows and slides) Hill slope failures coupled to channel Vertical incision present in catchment Bank erosion/lateral migration Unvegetated bars Wooded/forested areas in catchment Infrastructure type (see Drawing 11.4.3.1 d, Catchment Truim) | See Drawing 1: Yes Yes Yes Yes Yes Yes Yes Yes Yes There are extensive sediment sources wi these are delivered to the Truim from th reduced getting to the Truim by the under and by the SSE a | fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage 1.4.3.2, Catchment Truim Uthin catchment, but not with a direct impact on the Truim Currently impacting on the road Through main channel thin the Truim catchment, fro the steep slopes and e steep tributaries. Some of this supply is currently rsized culverts, catchment pits etc. that form the A9, and Hydro power scheme. |

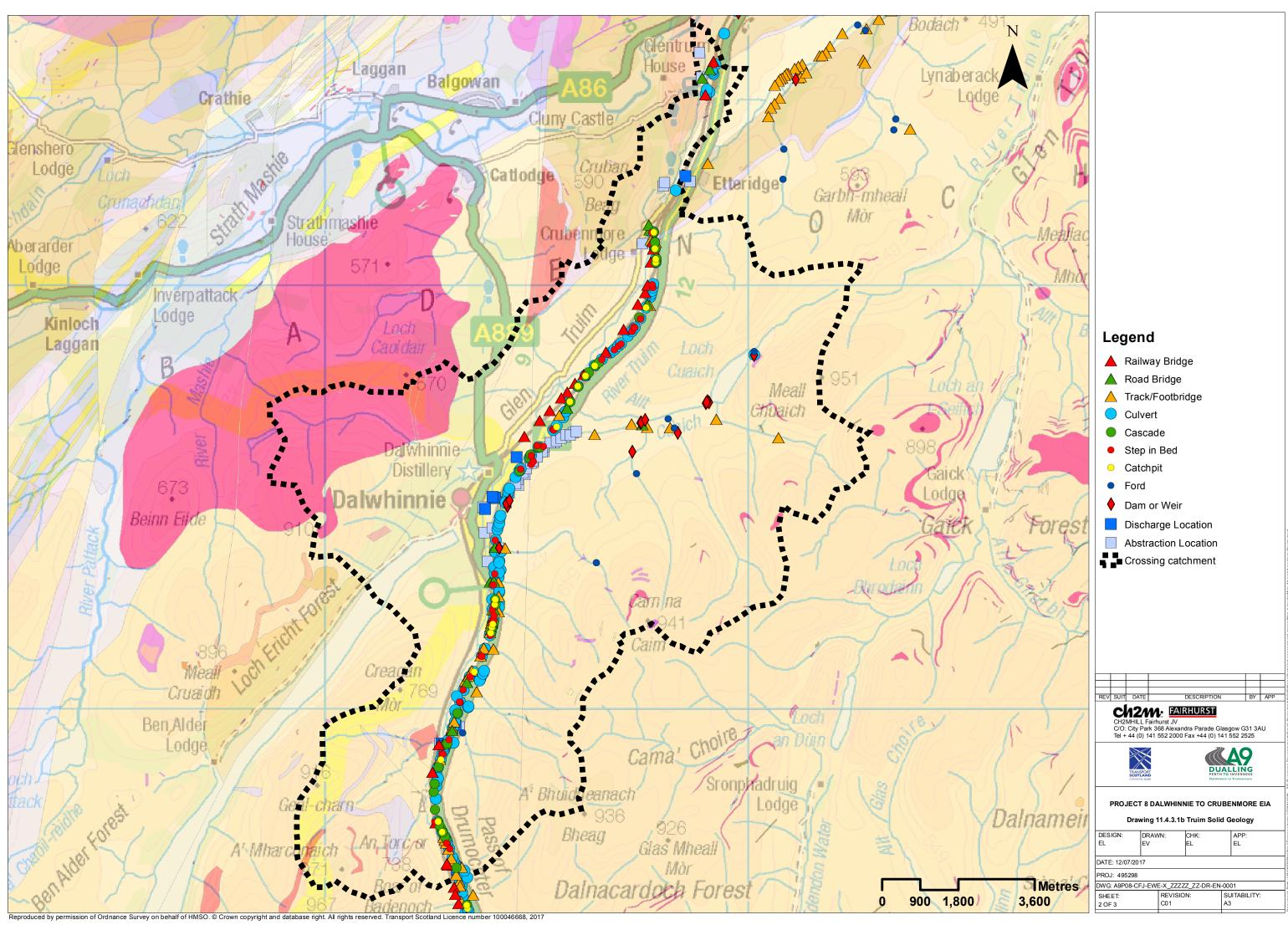
| | Channel morphology | Wandering | river type |
|------------------------|---|--|---|
| | Predominant sediment size | Gravels | |
| | Unvegetated bars | Yes | |
| | Vertical incision | Medium | |
| | Deposition | High | |
| | Lateral migration/bank erosion | High | At time at or close to the toe of the road embankment and railway embankment |
| Morphology and Process | Presence and nature of infrastructure (Map 1d) | Railway and Road, several bridges and culverts over tributaries. Aqueduct taking flow from catchment | |
| | Impact of infrastructure | Altering discharge and sediment inputs to the Truim, casing a change in the natural process, including channel narrowing | |
| | Channel realignment | Yes | Between the road and the railway in several locations |
| | Infrastructure type (see Drawing 11.4.3.1 d, Catchment Truim) | | |

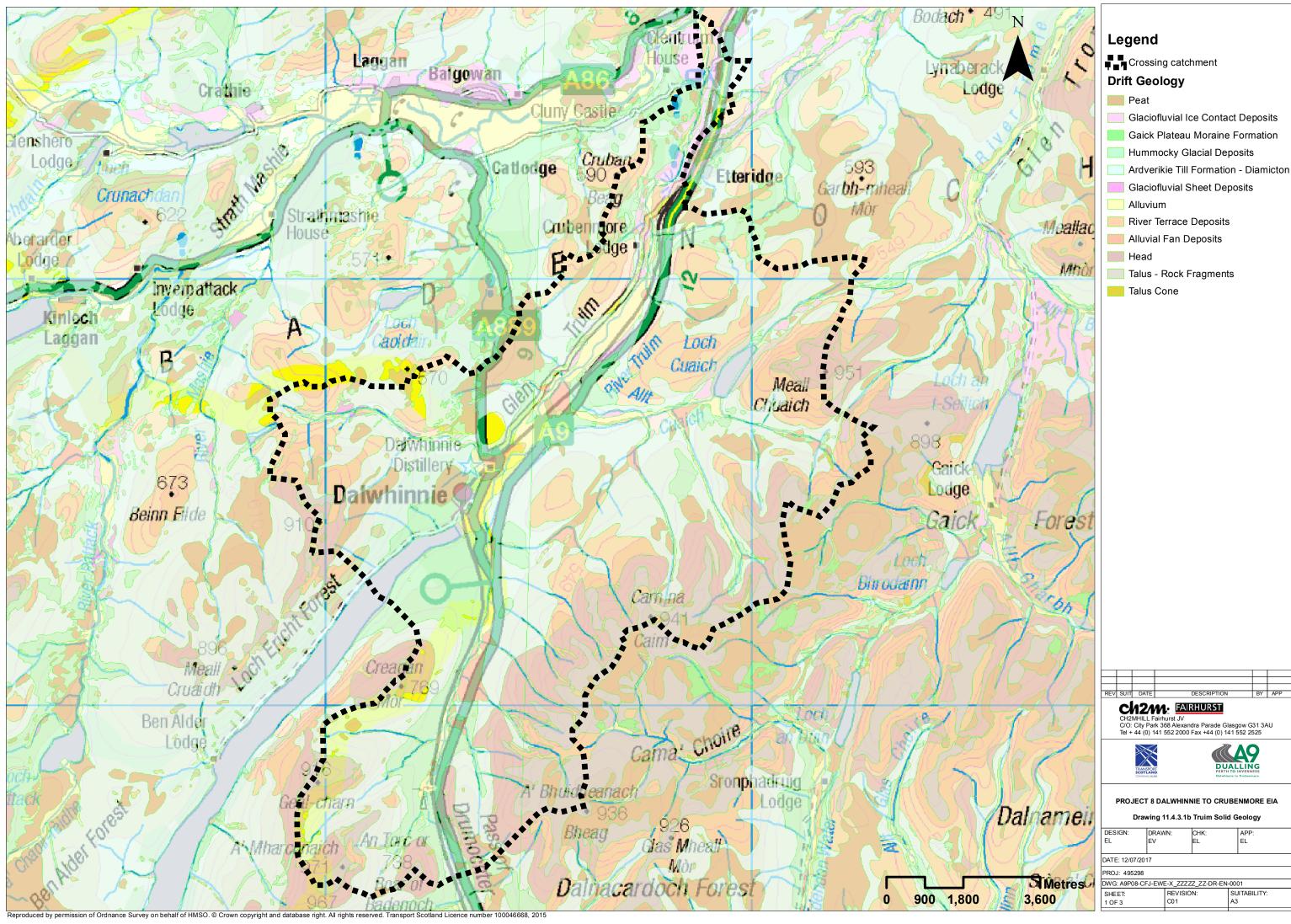
 Summary behaviour
 The Truim is an active channel, migrating laterally across its flood plain, however it has a number of pressures that are limiting the rate of this natural change.

 22% of the River Truim catchment is regulated by a hydropower scheme initiated in the 1930's, and extended in the 1940's and 50's with most of the water abstracted going into Loch Ericht in the Tay catchment. Loch an t-Seilich has a compensation flow of 1.263m3/s released continuously down through the fish pass on the dam, with flows above this diverted to Loch Cuaich or spilled, and a flow of 0.684m3/s is released continuously down the Truim at Dalwhinnie through the fish pass on the intake (Enviro Centre, 2008). All of the bed load is trapped behind the diversion dams has historically been removed for the river system and stockpiled (Gilvear, 2004).

As well as the Hydropower scheme the flow and sediment supply of the Truim are also impacted by the tributary crossings of the A9 and the Railway, where these are undersized and reducing flow and sediment supply to the main channel. There are also areas of bank protection along the channel to protect the railway and road embankments from erosion, as well as locations where bank protection may be required in the near future. Despite these pressures the morphology of the channel is varied and as expected for a channel of this type. There is little bank protection fixing the channel, and there is good channel floodplain connectivity.







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