Appendix 11.4

Hydromorphology Assessment Part 4

Annex 11.4.3 - Hydromorphological Catchment Assessment - 32-35

Catchment No.	**32-35**
Catchment Name	-

Channel Nature	Nature of water course	Drain
	Size of water course	Other

Quantitative Spatial Elements	Catchment Area (km^2)	0.4
	Average slope in catchment (°)	17
	% Catchment over 750m (for snow melt risk)	0.1

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 32-35)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	32/33 on northern edge of alluvial fan of Allt an Creagach. Possible but low risk of avulsion to this channel

Environmental designations (see Drawing 11.4.3.1 c, Catchment 32-35)	Ramsar	No	
	SAC	River Spey Drumochter Hills	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

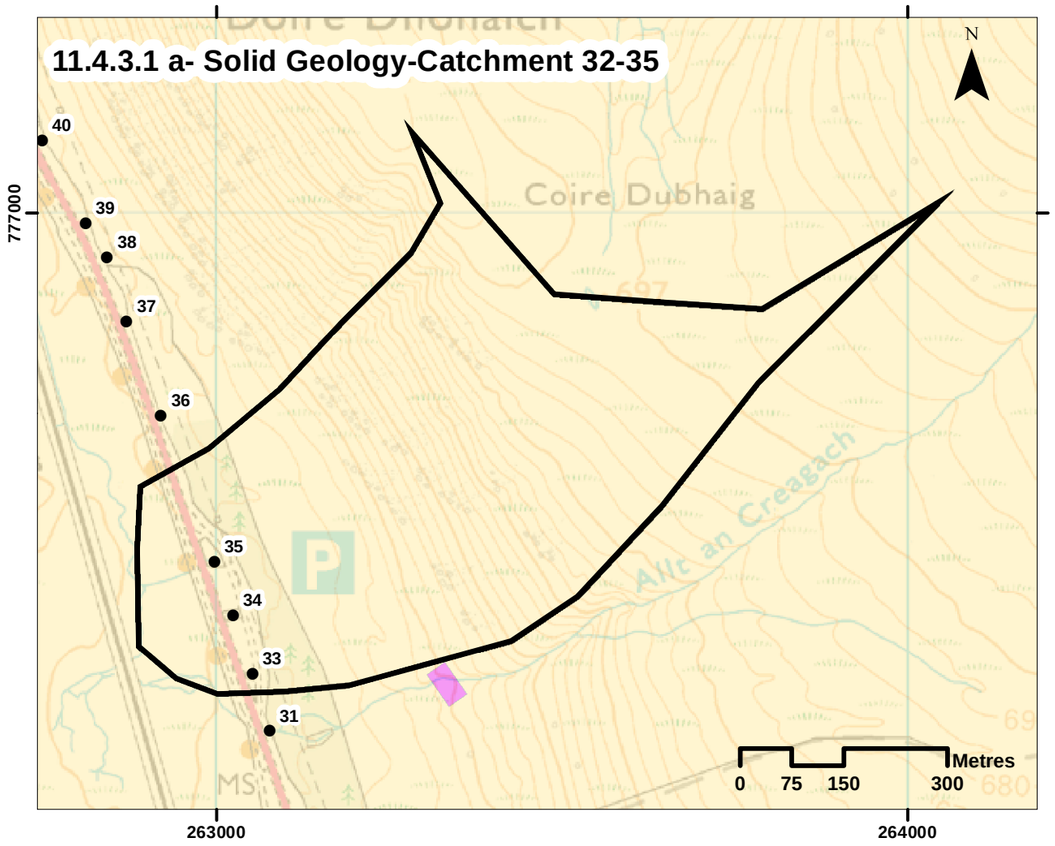
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 32-35	
	Is peat present in the catchment?	Yes	Reasonably extensive on flatter slopes in upper catchment
	Is there a bog burst risk?	Yes	Low
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	Yes	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	Yes	
	Vertical incision present in catchment	Yes	
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	Yes	Potential for floating debris to block crossings
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 32-35)	Track crossing upstream	Crossings may act to reduce sediment inputs downstream
	Comment on sediment source potential in catchment	Incision and hillslope failures in the till provide a sediment source	
	Comment on sediment supply potential to crossing	Steep, channelized slopes supply sediment to the drains	

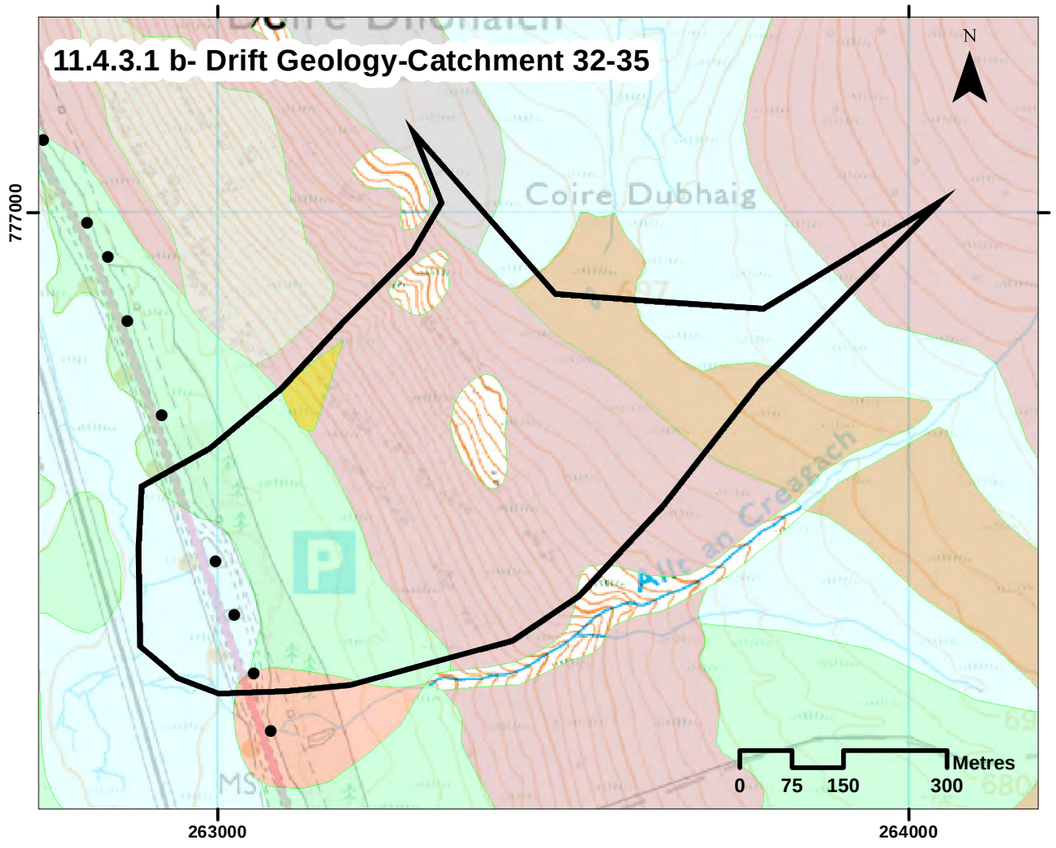
Morphology and Process- Reach upstream of crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel	
	Unvegetated bars	None	
	Vertical incision	High	Crossing 32
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 32-35)	Layby	
	Impact of infrastructure	None	
	Channel realignment	Yes	

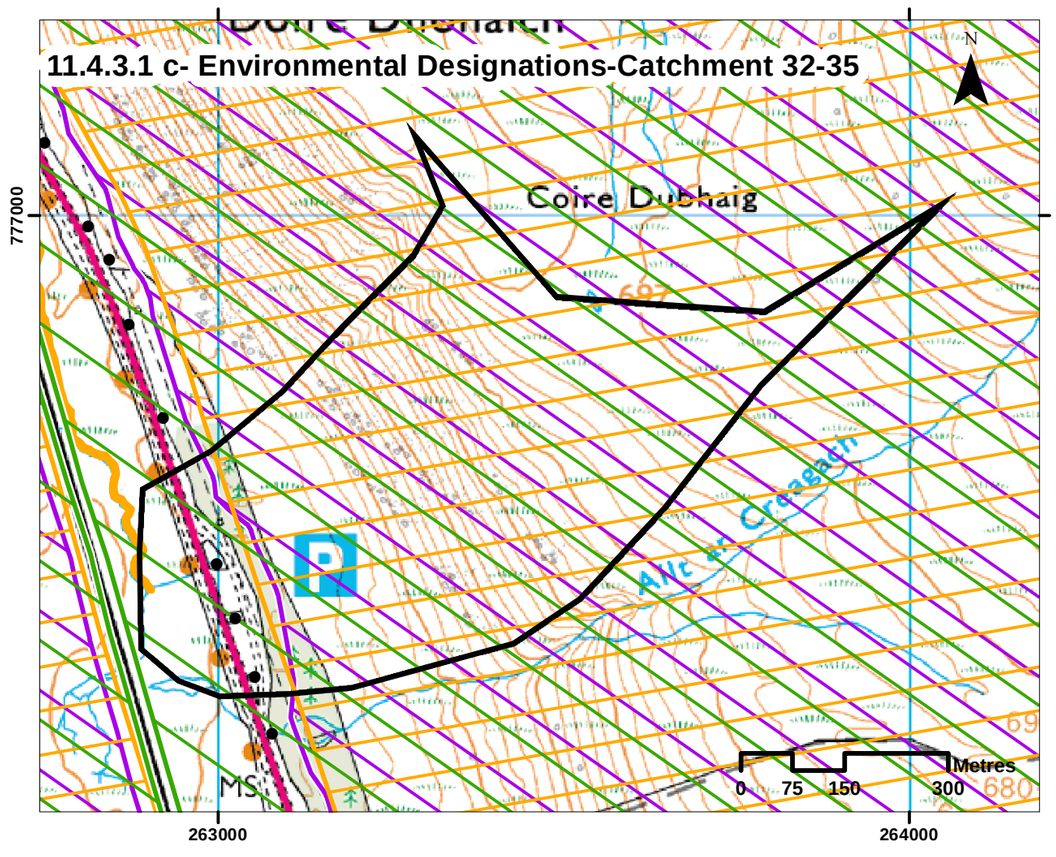
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel	
	Estimated discharge at 1:200 event (m^3/s)	1.88	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	Low	Crossing 34 and 35
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	Yes	Crossing 35

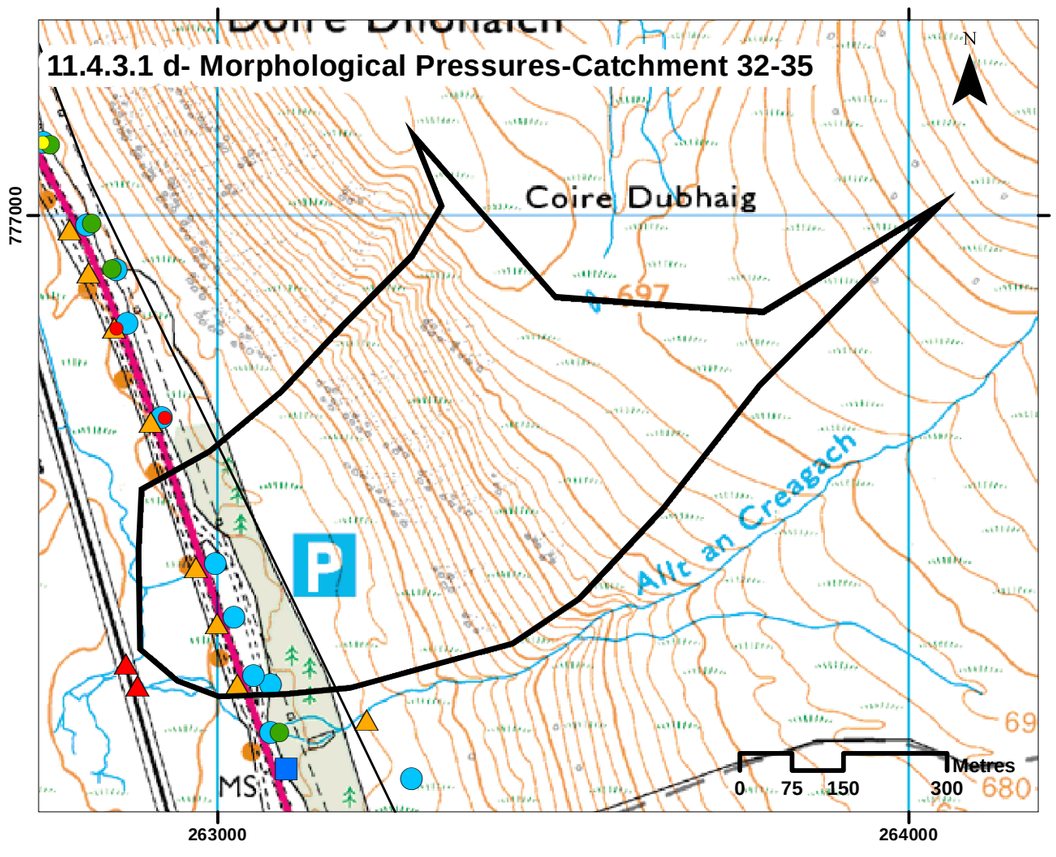
Morphology and Process- Reach downstream of crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	High	Crossing 32
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 32-35)	NMU Crossing	
	Impact of infrastructure	None	
	Channel realignment	Yes	

Summary behaviour	Small hillslope drainage channels have been formalised as part of the A9. Channels relatively stable but some activity.









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Catchpit
- Discharge Location
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 32-35 Catchment Overview

DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3

Weather Post

Creagan Doire Dhonaich

724

Pass of Drumochter

Coire Dubhaig

697

An Torc or Boar of Badenoch

739

Allt an Creagach

Allt a' Cha

MS

P

P

42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25

Debris flow adding sediment to the channel above the track

Small channels incised into very steep hillside

Spring line- start of channelised flows

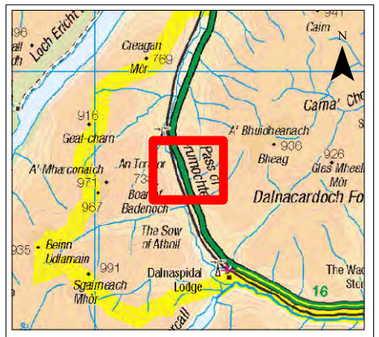
Some forestry- local change to hydrology and potential increase in sediment and floating debris inputs in the short to medium term

Flat valley floor- area of unconstrained floodplain

Hummocky glacial deposits- potential source of gravels and fines

N

0 87.5 175 350 Metres



Legend

- Major crossing
- Minor crossing
- Other crossing
- Peat
- Coupled debris flow
- Hill slope failure
- Break in slope
- Incision
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2.
Catchments 32-35 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: I:\WKFP\P01\Proj\Transportation\mTNXUGH - TQ Business Development\Small Projects\A9DS\SMaps\Detailed assessment maps\Assessment 32-35.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 36-42

Catchment No.	**36-42**
Catchment Name	-

Channel Nature	Nature of water course	Drain
	Size of water course	Other

Quantitative Spatial Elements	Catchment Area (km^2)	0.7
	Average slope in catchment (°)	23
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 36-42)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	None	

Environmental designations (see Drawing 11.4.3.1 c, Catchment 36-42)	Ramsar	None	
	SAC	River Spey	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey
		Drumochter Hills	Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

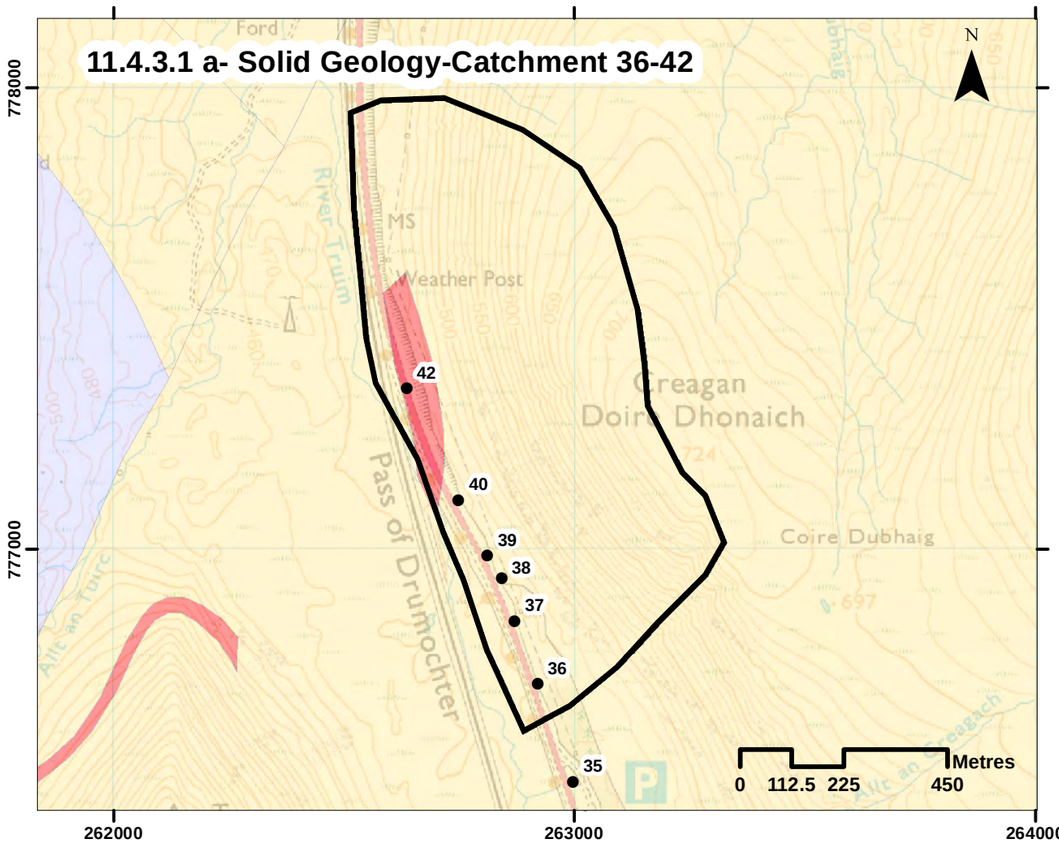
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 36-42	
	Is peat present in the catchment?	None	
	Is there a bog burst risk?	None	
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	None	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	Yes	
	Vertical incision present in catchment	Yes	
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 36-42)	Track crossing upstream	Crossings may act to reduce sediment inputs downstream
	Comment on sediment source potential in catchment	Incision and hillslope failures in the till provide a sediment source	
	Comment on sediment supply potential to crossing	Very steep, channelized slopes supply sediment to the drains	

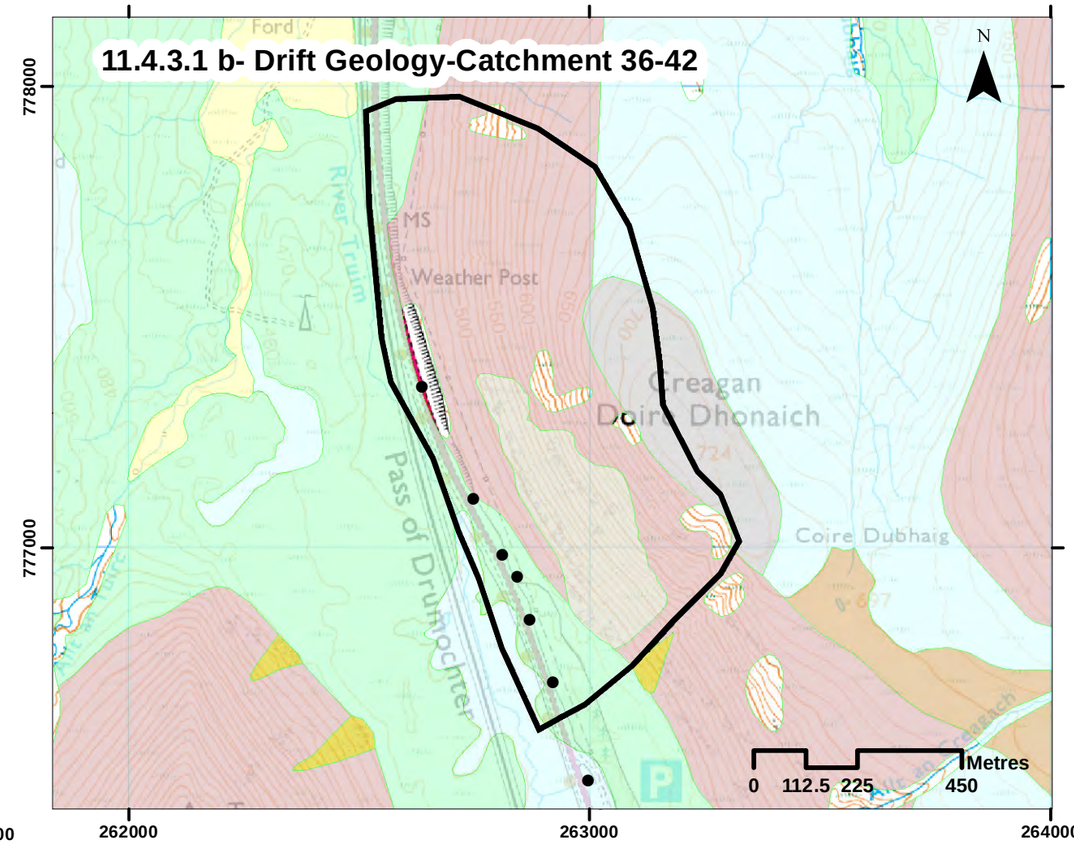
Morphology and Process- Reach upstream of crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel	
	Unvegetated bars	None	
	Vertical incision	Low	
	Deposition	Low	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 36-42)	Cascade	With gravel bed
	Impact of infrastructure	None	
	Channel realignment	None	

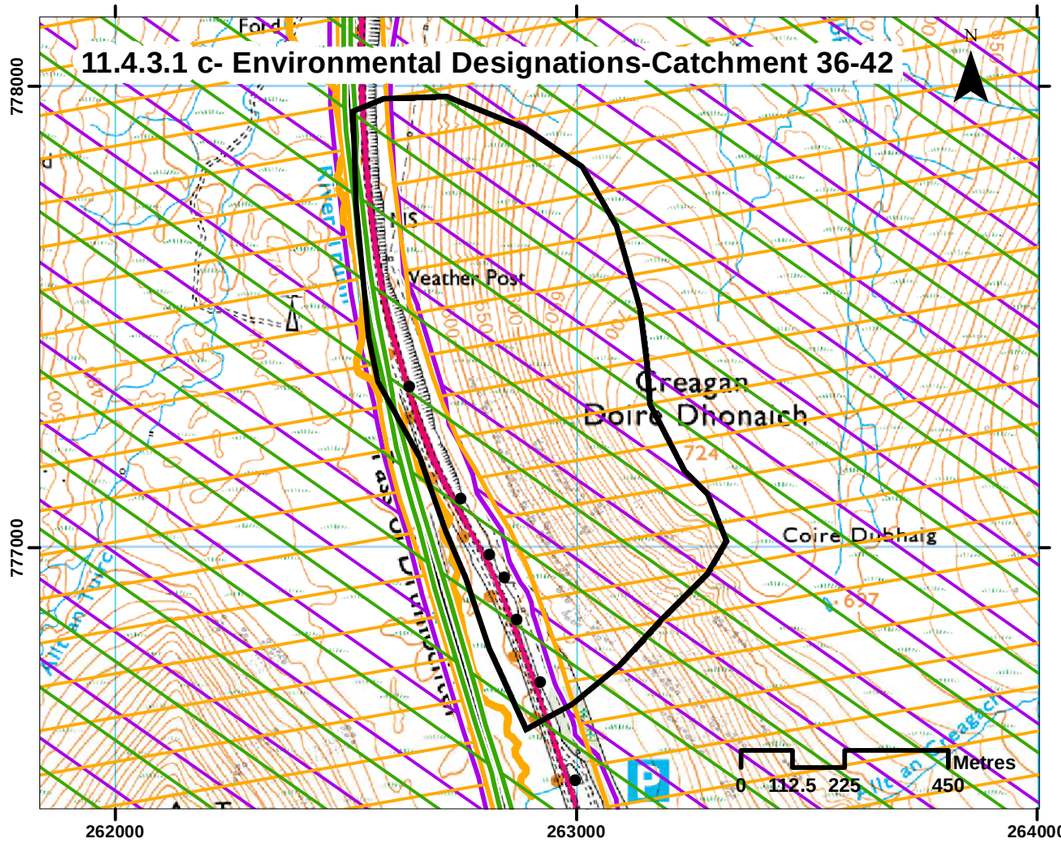
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel	
	Estimated discharge at 1:200 event (m^3/s)	3.86 (Crossing 36)	Design flows for all crossings 36-42 0.55 m^3/s
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

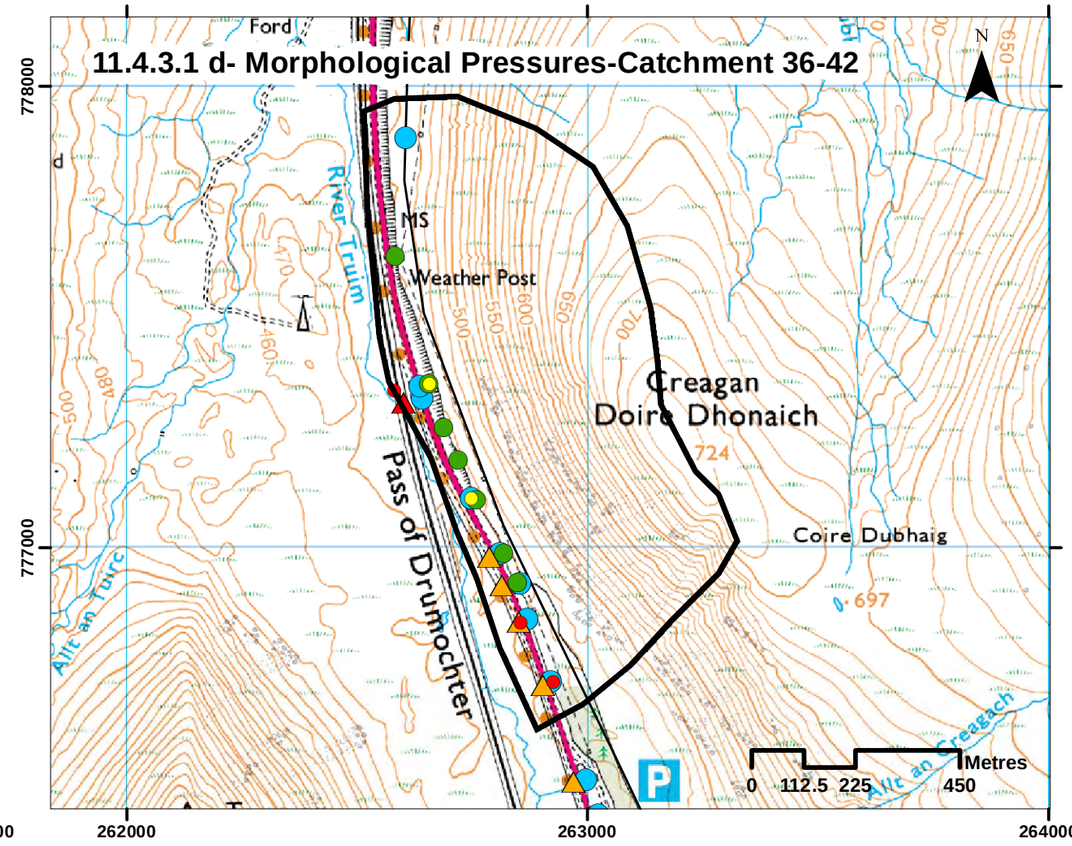
Morphology and Process- Reach downstream of crossing	Channel morphology	Engineered	
	Predominant sediment size	None	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 36-42)	NMU crossing	
	Impact of infrastructure	None	
	Channel realignment	None	

Summary behaviour	Small hillslope drainage channels have been formalised as part of the A9. Channels relatively stable but some activity. Some drains have a gravel bed, suggesting sediment inputs from hillslope. Upstream cascade (40) does not appear to take flow, but shows some downstream incision. Need to consider sediment transport through the crossings.









Legend

General
- Crossing location

Solid Geology
- Gaick Psammite Formation - Psammite
- Grampian Group - Psammite, Quartzose

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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Catchpit
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 36-42 Catchment Overview

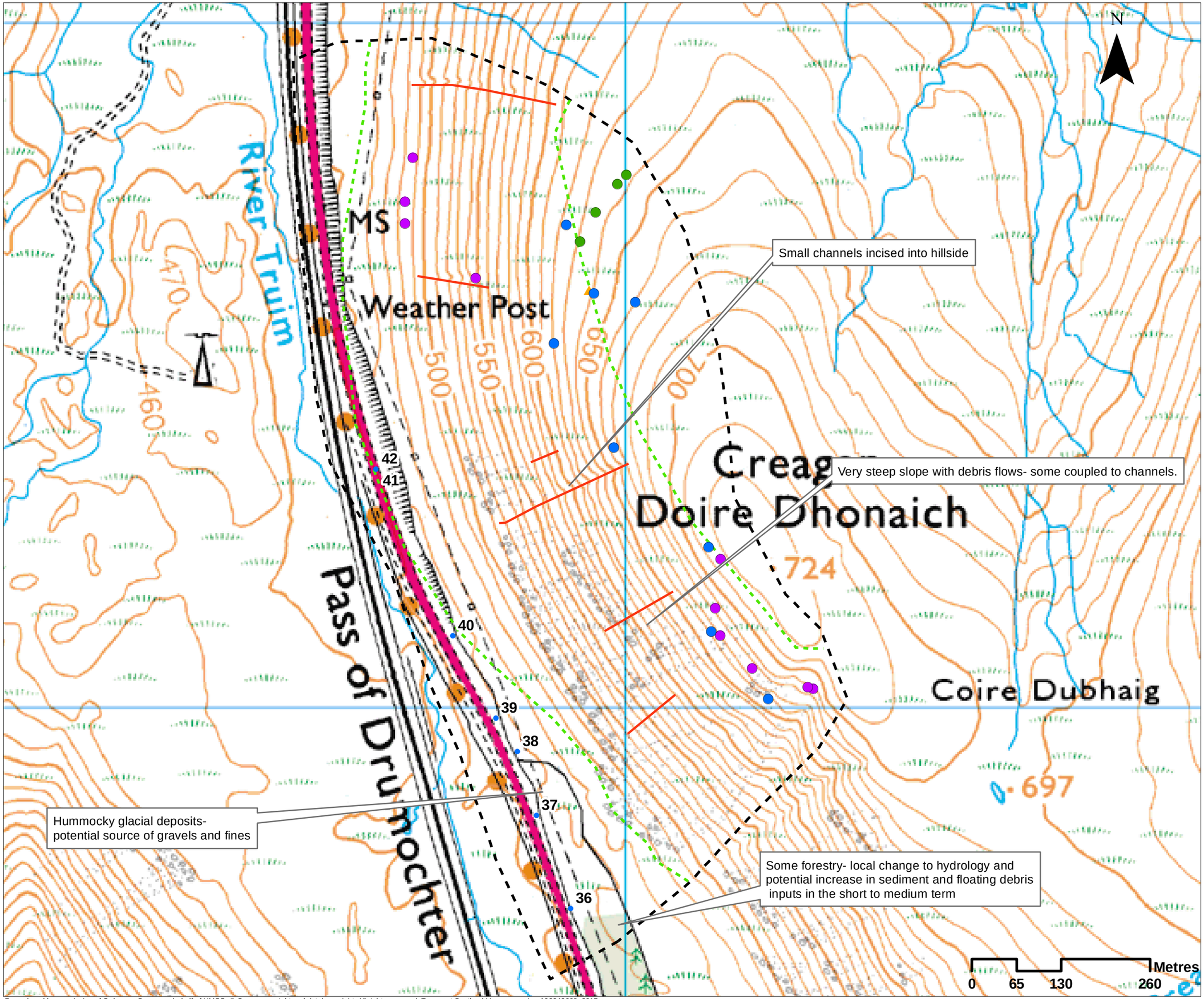
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	

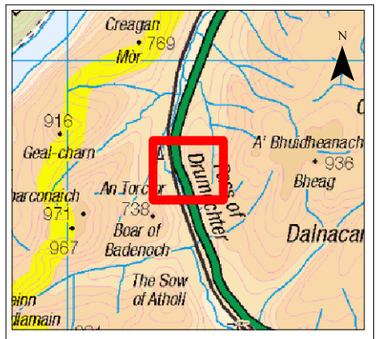
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Other crossing
- Peat slide
- Coupled debris flow
- Debris flow
- Hill slope failure
- Break in slope
- Incision
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m: 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2.
Catchments 36-42 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: \\BHXFPP001\Proj\Transportation\TNXU01a - TQ Business Development\Email Projects\A9\GIS\Maps\Detailed assessment maps\Assessment 36-42.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 43

Catchment No.	**43**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Minor

Quantitative Spatial Elements	Catchment Area (km^2)	0.34
	Average slope in catchment (°)	16
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 43)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	No	

Environmental designations (see Drawing 11.4.3.1 c, Catchment 43)	Ramsar	No	
	SAC	River Spey	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey
		Drumochter Hills	Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

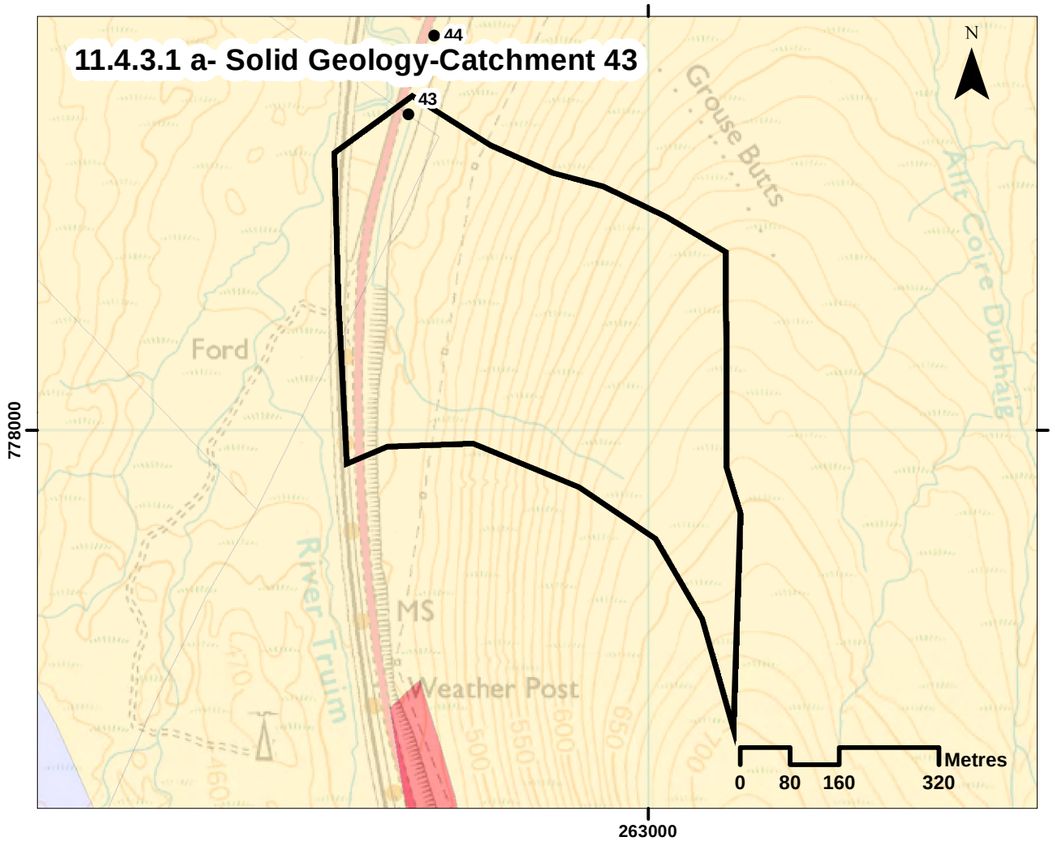
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 43	
	Is peat present in the catchment?	None	
	Is there a bog burst risk?	None	
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	None	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	Yes	
	Vertical incision present in catchment	Yes	Upstream of the track
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 43)	Track crossing	
	Comment on sediment source potential in catchment	Sediment may enter the channels from debris flows from steep slopes and from erosion of glacial deposits in the flatter hummocky areas	
	Comment on sediment supply potential to crossing	Straight channels and steep slopes have potential to supply sediment to the main channel quickly. Its lower slope will reduce the speed of supply to the crossing	

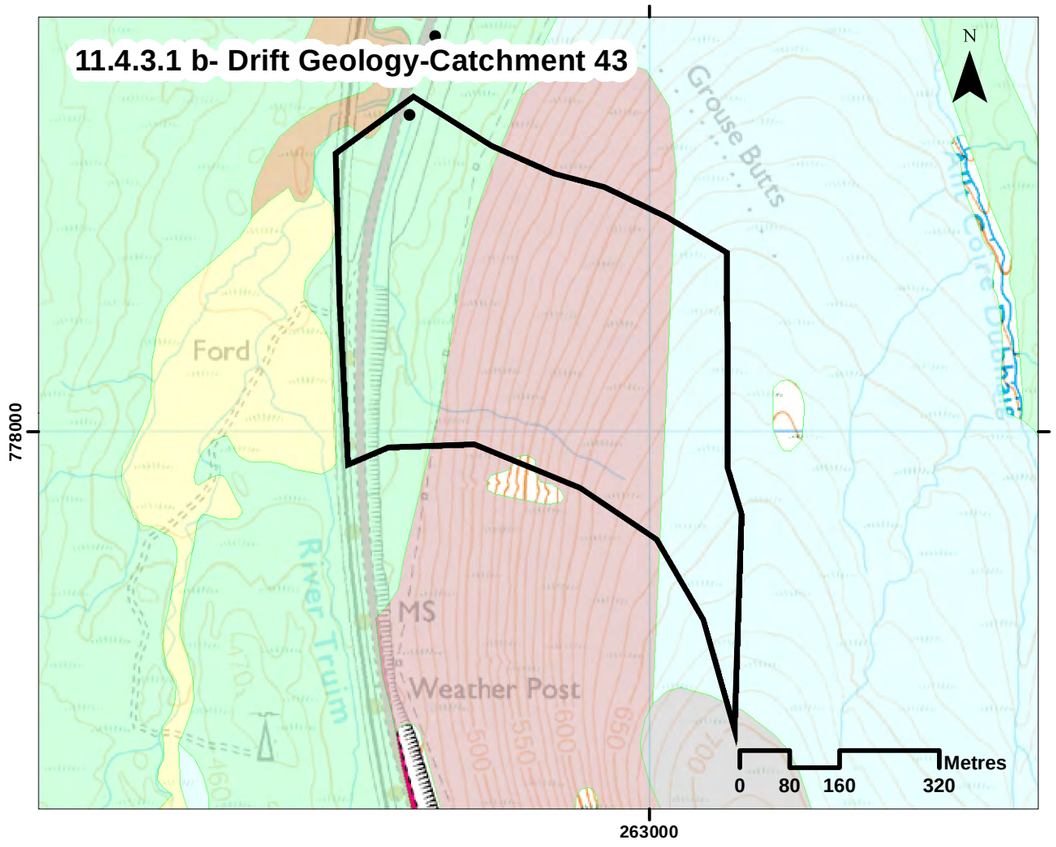
Morphology and Process- Reach upstream of crossing	Channel morphology	Engineered	Straightened channel, increase length, engineered bed and banks
	Predominant sediment size	None	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 43)	Drains	
	Impact of infrastructure	None	
	Channel realignment	Yes	

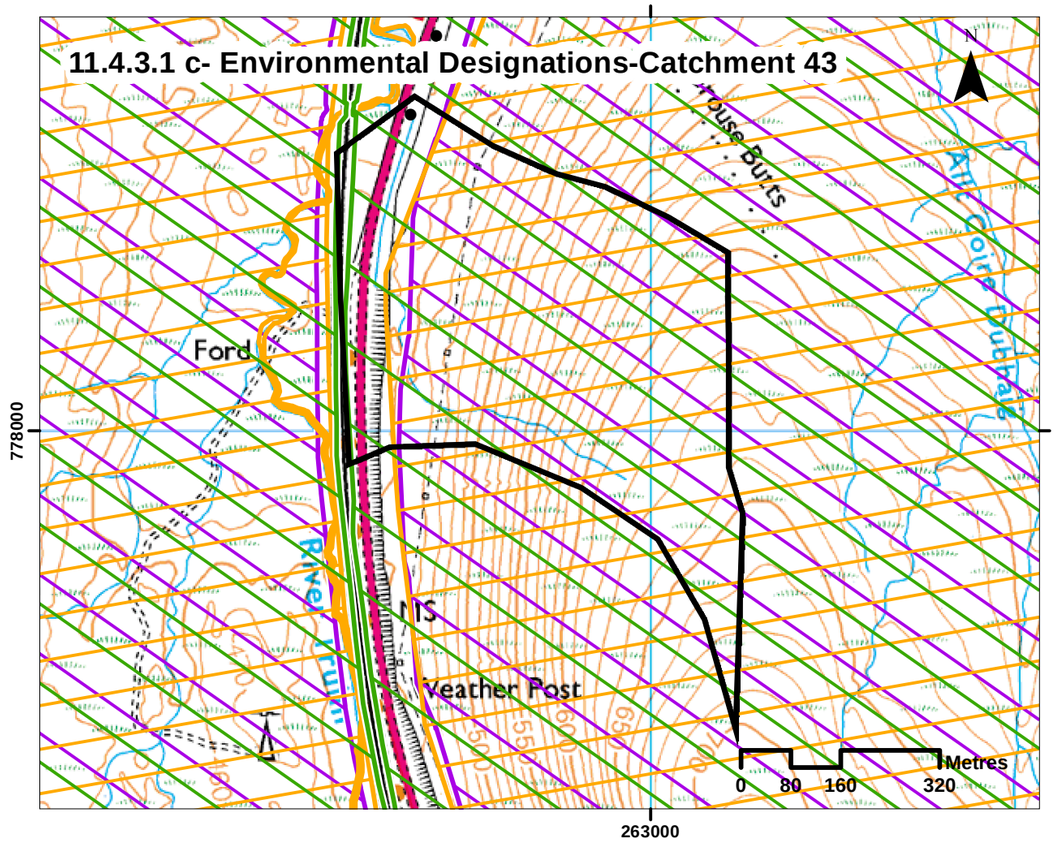
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	None	
	Estimated discharge at 1:200 event (m^3/s)	N/A	Design flow given as 0.93 m^3/s, which appears based on 30 year return period event.
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

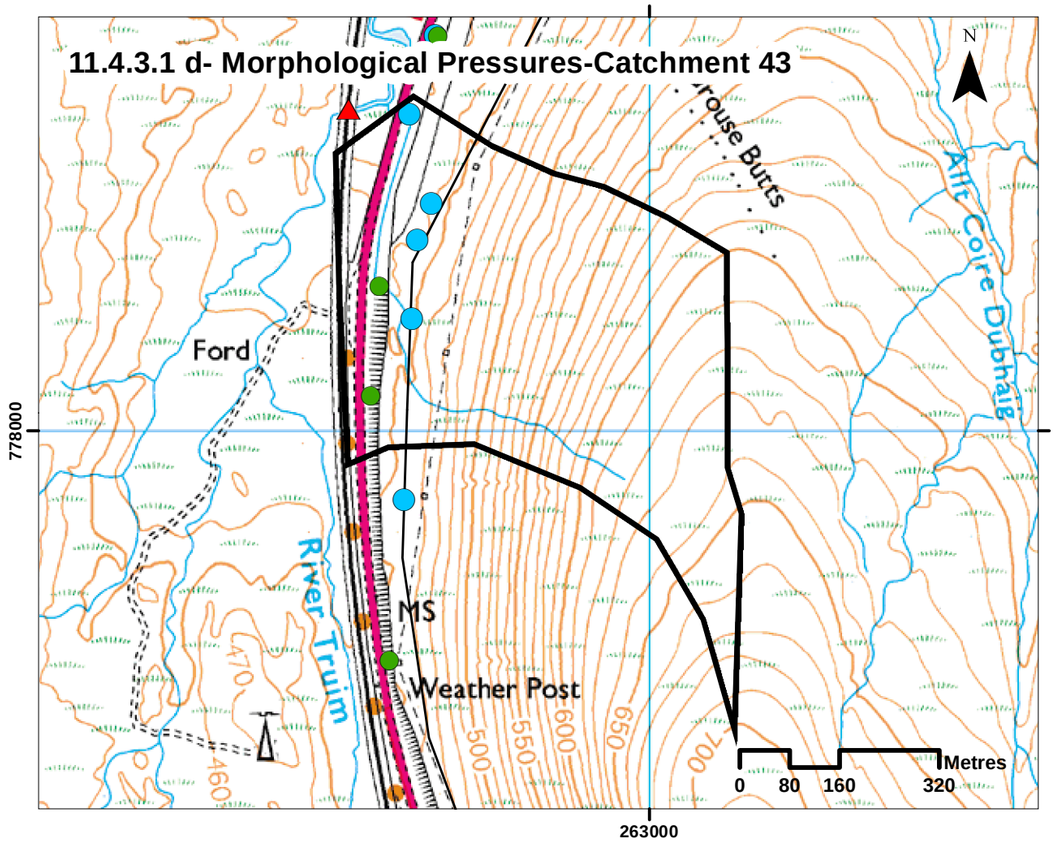
Morphology and Process- Reach downstream of crossing	Channel morphology	Plane-Riffle	
	Predominant sediment size	Cobble and boulder	
	Unvegetated bars	Some	
	Vertical incision	Low	As channel adjusts to changing position of Truim
	Deposition	Low	
	Lateral migration/bank erosion	Low	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 43)	None	
	Impact of infrastructure	None	
	Channel realignment	Yes	

Summary behaviour	Small hillslope channels have been formalised in a single straight, road-parallel channel at the bottom of the slope, which then cross the A9 in a single crossing. Sediment supply potential is relatively high in the catchment, but the realigned channel reduces the likely hood of sediment reaching the crossing. However deposition is likely to occur in the road-parallel section. Restoration potential/opportunity to change crossing location.









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Culvert
- Cascade
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 43 Catchment Overview

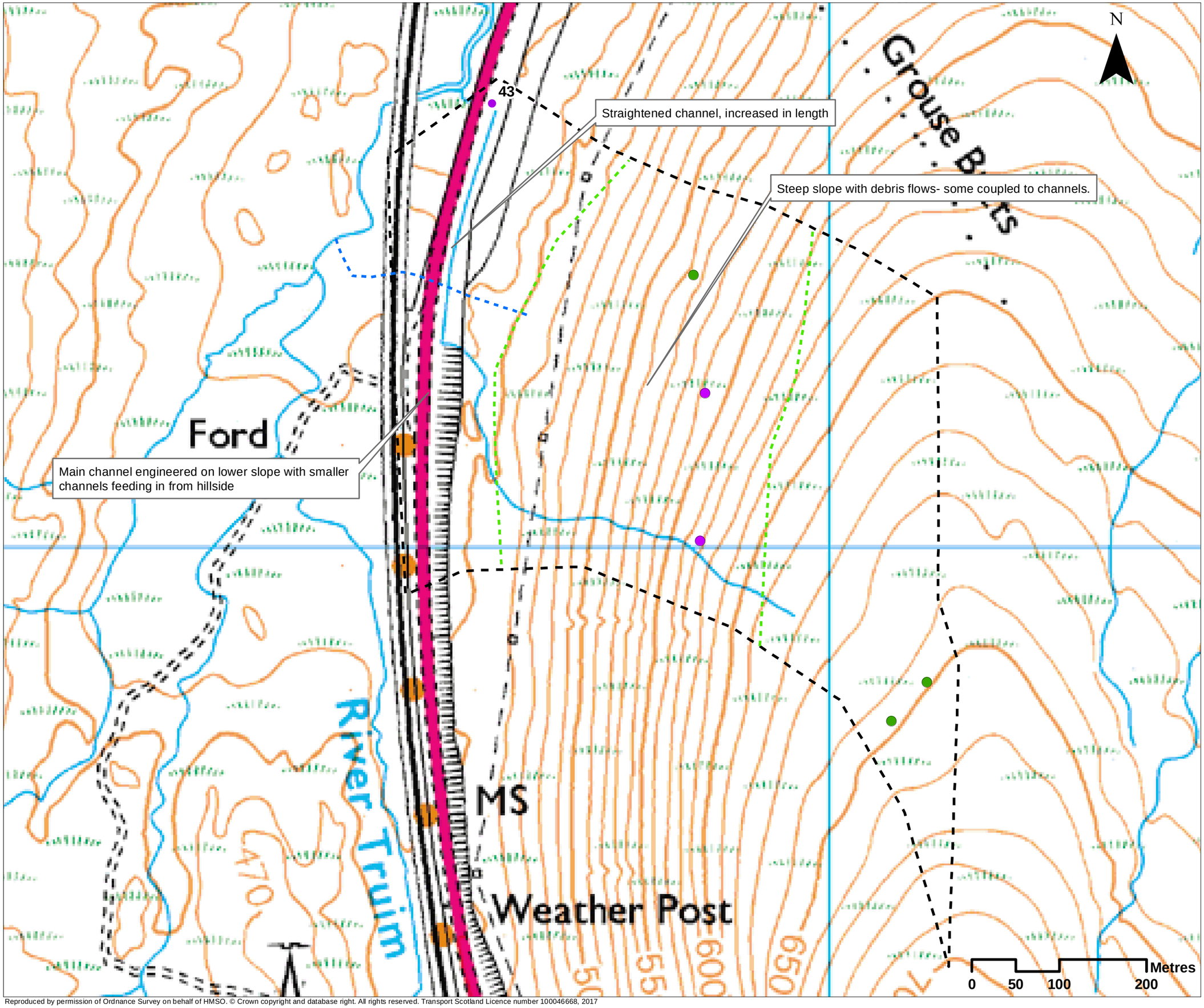
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

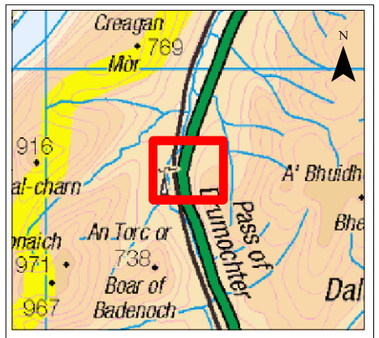
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Minor crossing
- Coupled debris flow
- Debris flow
- Break in slope
- Original channel
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 43 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 27/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: I:\BHKF\P903\Proj\Transportation\TXU\Gis\ - TQ Business Development\Small Projects\A9GISMaps\Detailed assessment maps\4sessment 43.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 44-50

Catchment No.	**44-50**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Other

Quantitative Spatial Elements	Catchment Area (km^2)	0.3
	Average slope in catchment (°)	13.5
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 44-50)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	No	

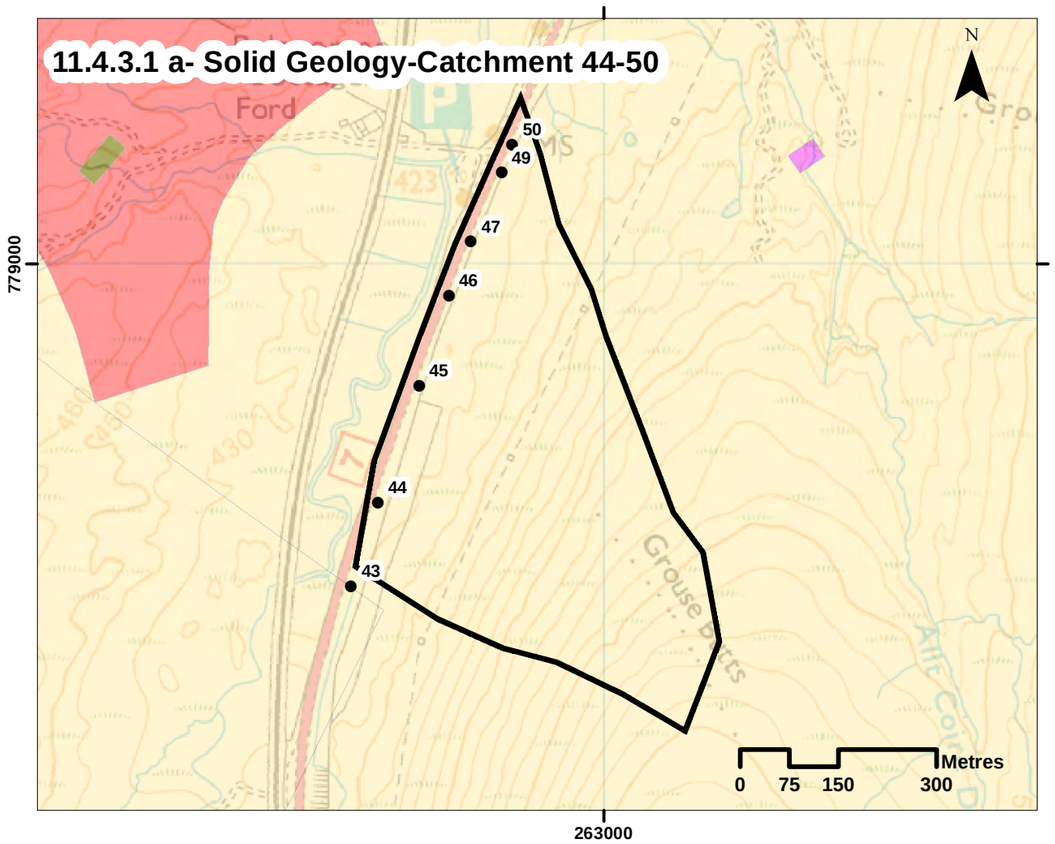
Environmental designations (see Drawing 11.4.3.1 c, Catchment 44-50)	Ramsar	No	
	SAC	Drumochter Hills	Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

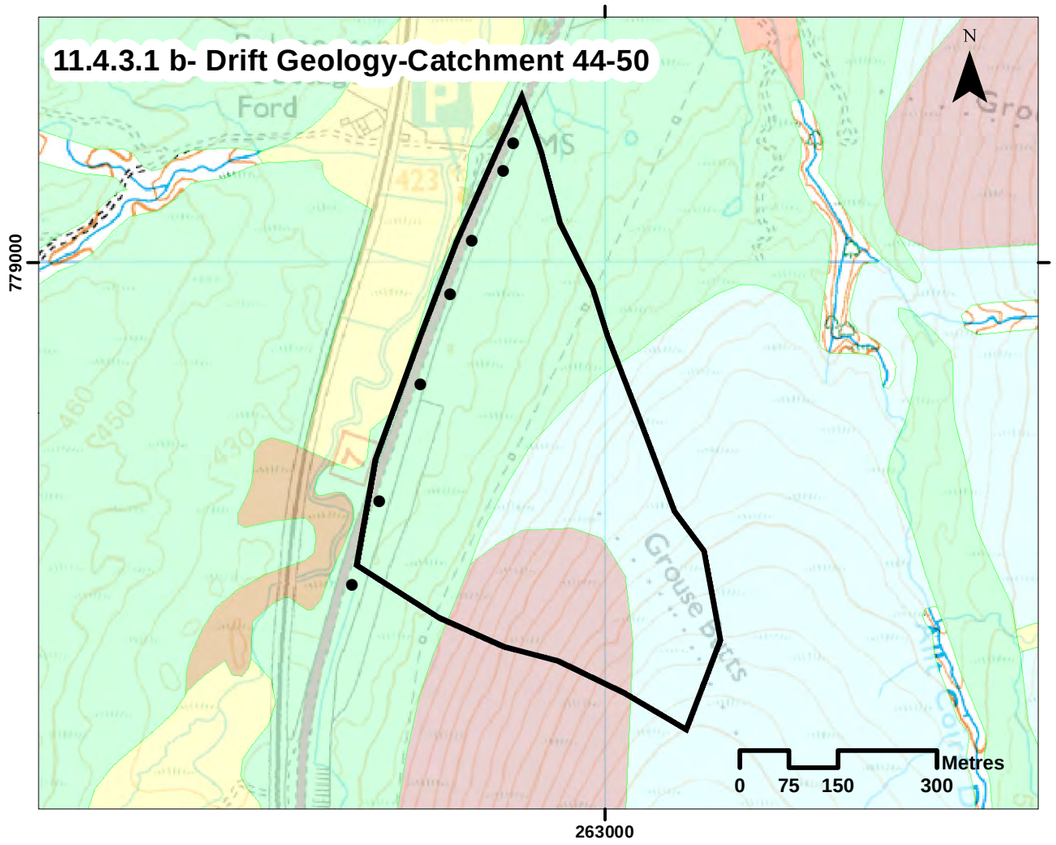
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 44-50	
	Is peat present in the catchment?	None	
	Is there a bog burst risk?	None	
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	Yes	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	Yes	
	Vertical incision present in catchment	Yes	
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 44-50)	Track crossing upstream	Crossings may act to reduce sediment inputs downstream
	Comment on sediment source potential in catchment	Incision and hillslope failures in the till provide a sediment source	
	Comment on sediment supply potential to crossing	Steep, channelized slopes supply sediment to the drains	

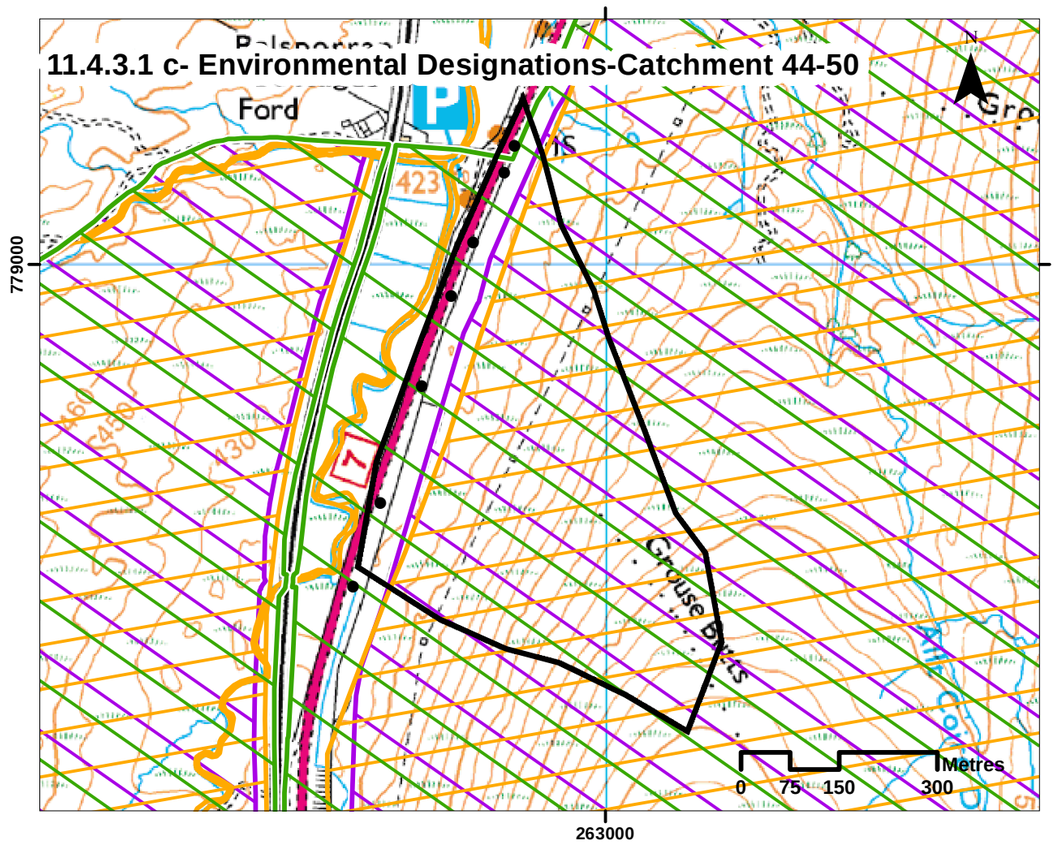
Morphology and Process- Reach upstream of crossing	Channel morphology	Engineered	Crossing 46 - Cascade upstream
	Predominant sediment size	Various	
	Unvegetated bars	None	
	Vertical incision	Medium	Crossing 44 and 46
	Deposition	Medium	Crossing 44 and 47
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 44-50)	Yes	Track crossing
	Impact of infrastructure	Fixed banks	
	Channel realignment	Yes	All crossings

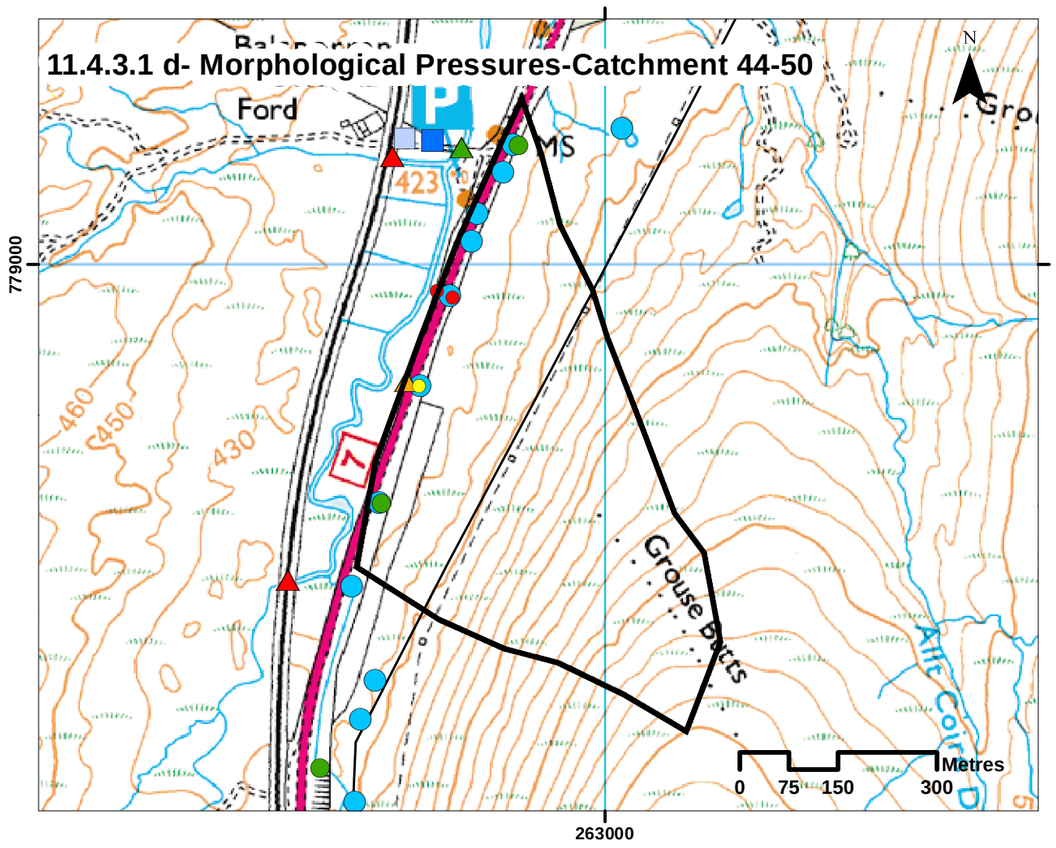
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravels	
	Estimated discharge at 1:200 event (m^3/s)	N/A	Individual design flows 0.15-0.55m^3/s
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

Morphology and Process- Reach downstream of crossing	Channel morphology	Engineered	
	Predominant sediment size	None visible	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 44-50)	None	
	Impact of infrastructure	None	
	Channel realignment	Yes	All crossings
Summary behaviour	Small hillslope drainage channels have been formalised as part of the A9. Channels relatively stable but some activity particularly at crossing 46.		









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Road Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Catchpit
- Discharge Location
- Abstraction Location
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 44-50 Catchment Overview

DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

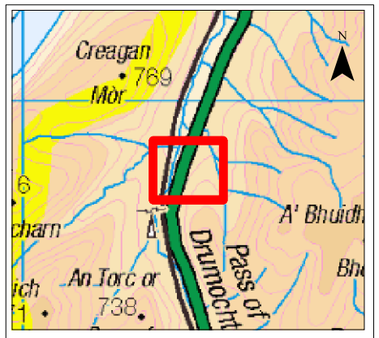
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3

Cottages
Ford
423
MS
51
50
49
48
47
46
45
44
43
430
7
Formalised and straightend channels
Incision on entrance to crossing
Hummocky glacial deposits- potential source of gravels and fines
Formalised and straightend channels
Small channels incised into hillside
Formalised and straighten channel. May be incising.
Grouse Butts
Allt Cou
N
0 45 90 180 Metres



Legend

- Minor crossing
- Other crossing
- Coupled debris flow
- Debris flow
- Hill slope failure
- Unvegetated bar
- Break in slope
- Original channel
- Incision
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m· 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

TRANSPORT SCOTLAND
A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2.
Catchments 44-50 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: I:\BHKF\P903\Proj\Transportation\mT\NXUGH - TQ Business Development\Small Projects\495298\Maps\Detailed assessment maps\4sessment 44-50.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 51

Catchment No.	**51**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Minor

Quantitative Spatial Elements	Catchment Area (km^2)	0.18
	Average slope in catchment (°)	9
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 51)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	No	Adjacent catchment has alluvial fan deposits but this crossing unlikely to affected by channel avulsion in that catchment

Environmental designations (see Drawing 11.4.3.1 c, Catchment 51)	Ramsar	No	
	SAC	River Spey Drumochter Hills	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

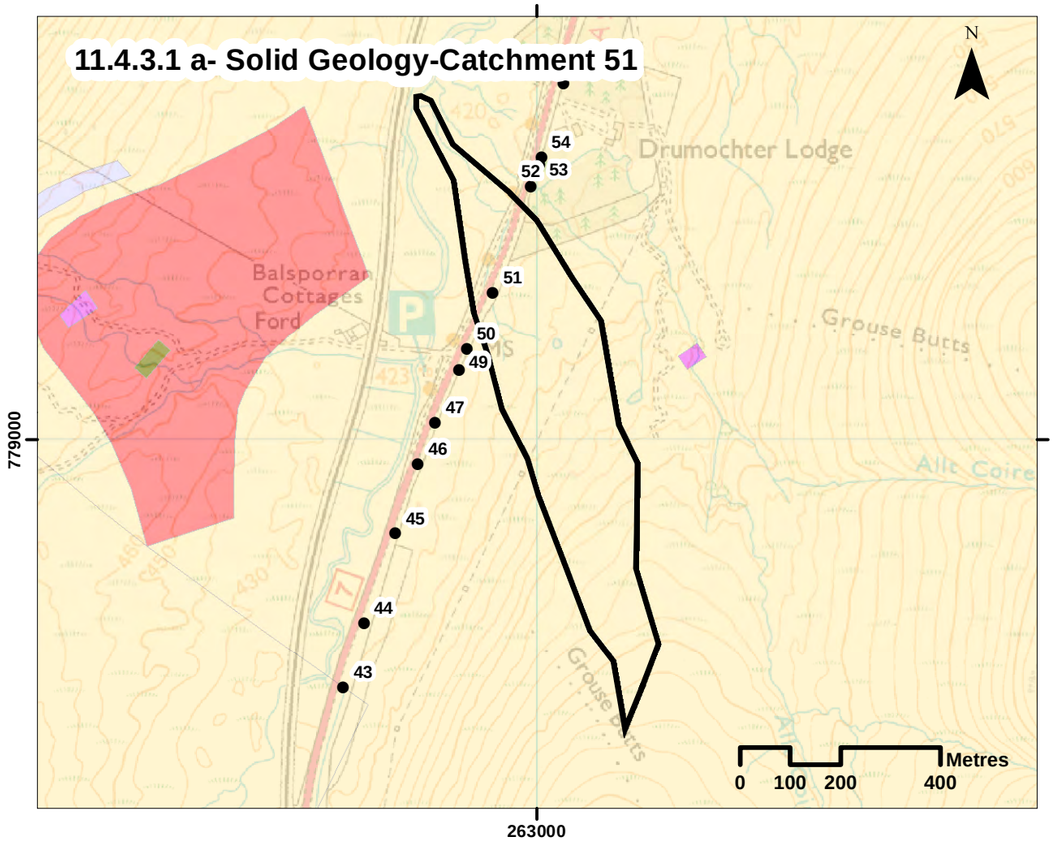
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 51	
	Is peat present in the catchment?	No	
	Is there a bog burst risk?	No	
	Current valley side or terrace erosion	No	
	Potential valley side or terrace erosion	Yes	
	Hill slope failures (including peat slides and debris flows and slides)	No	
	Hill slope failures coupled to channel	No	
	Vertical incision present in catchment	No	
	Bank erosion/lateral migration	No	
	Unvegetated bars	No	
	Wooded/forested areas in catchment	Yes	Small area upstream of crossing but channel does not cross so unlikely to have floating debris
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 51)	No	
	Comment on sediment source potential in catchment	Low sediment source from catchment, however the mounds of glacial material have the potential to provide sediment to the channel if it were to erode thought them	
	Comment on sediment supply potential to crossing	Channel is on a lower slope, but has potential to transport sediment to the crossing	

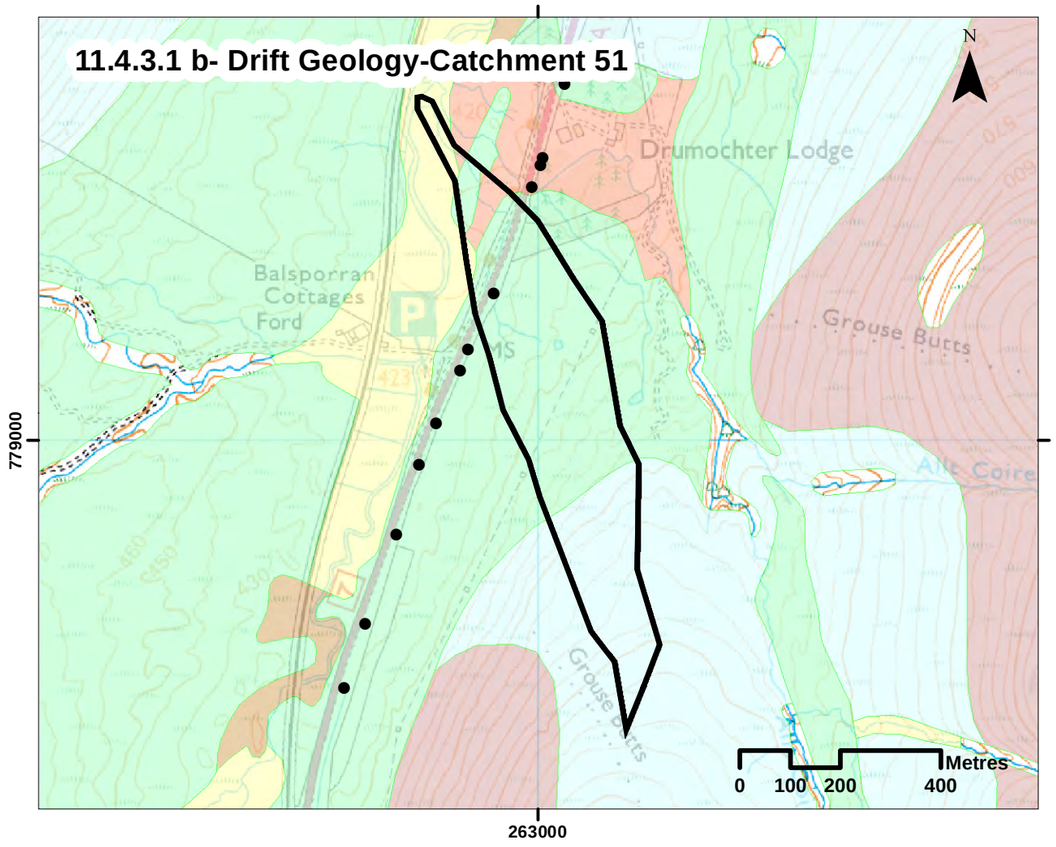
Morphology and Process- Reach upstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Cobbles	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	Low	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 51)	Track crossing	
	Impact of infrastructure	Fixed banks	
	Channel realignment	Yes	Straightened

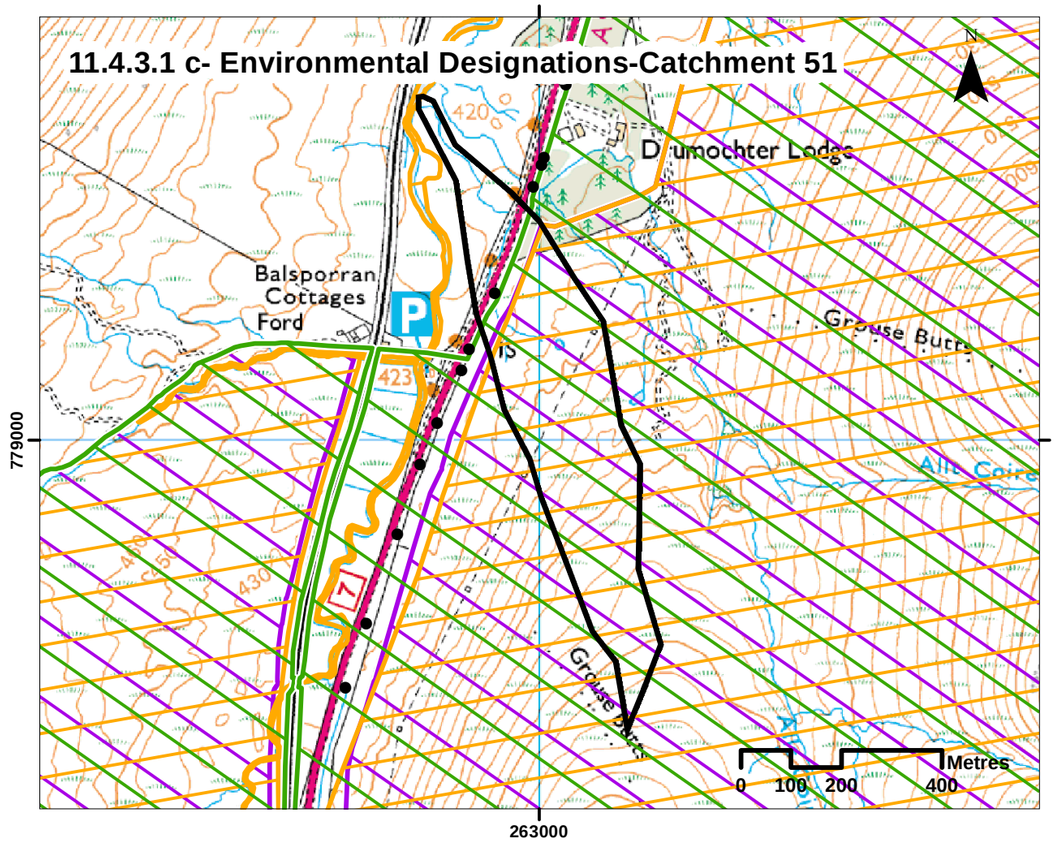
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel - Cobbles	
	Estimated discharge at 1:200 event (m^3/s)	-	0.55 m^3/s design flow
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

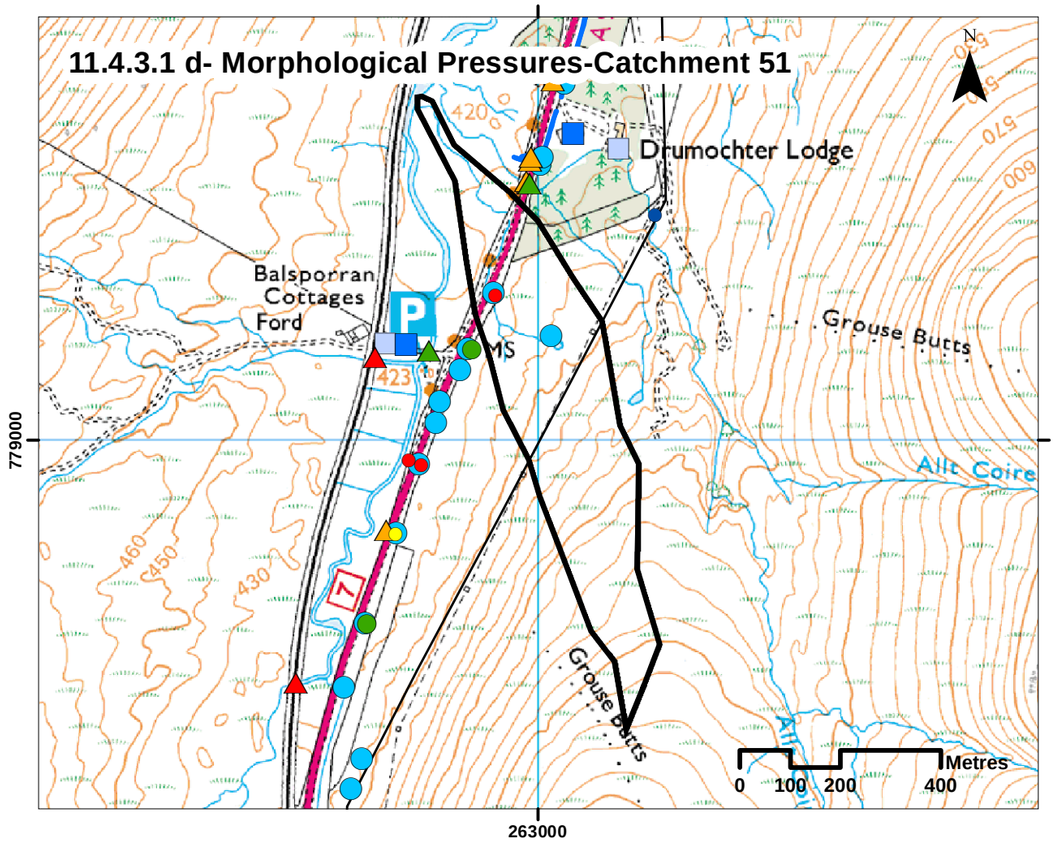
Morphology and Process- Reach downstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	None visible	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 51)	NMU crossing	
	Impact of infrastructure	Fixing bed and bank position, potential to impound flows	
	Channel realignment	Yes	Possible parallel realignment undertaken to accommodate A9

Summary behaviour	Little sediment is currently entering channel, however there is potential for greater sediment inputs should the channel start to erode into the glacial mounds. Also construction of ETL track will have caused at least temporary disruption to flows from pond on upstream side of ETL track.









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Road Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Catchpit
- Ford
- Discharge Location
- Abstraction Location
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

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

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 51 Catchment Overview

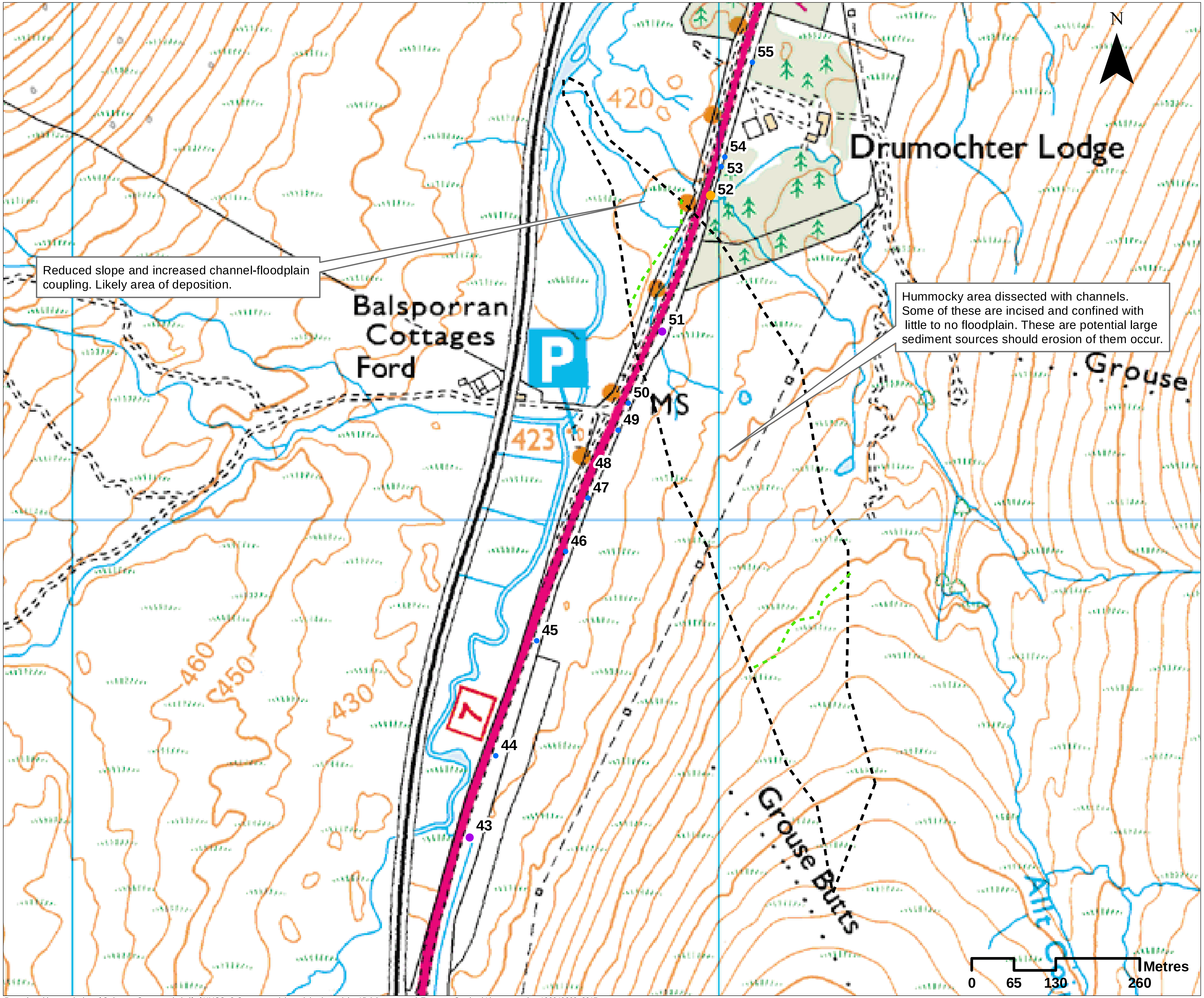
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

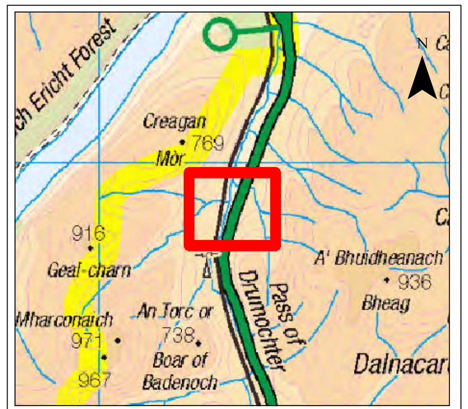
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Major crossing
- Minor crossing
- Other crossing
- Break in slope
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 51 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: \\BHX FPP01\Proj\Transportation\TNXUGM - TQ Business Development\Small Projects\A9\GIS\Maps\Detailed assessment maps\Assessment 51.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 52

Catchment No.	**52**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Major

Quantitative Spatial Elements	Catchment Area (km^2)	3.5
	Average slope in catchment (°)	14
	% Catchment over 750m (for snow melt risk)	31%

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 52)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	Crossing on alluvial fan with its apex c. 400m u/s of crossing. Limited risk of avulsion as fan looks relatively stable (very mature pine trees growing on it). However, 1in200 event would generate 18 m3/s discharge which may cause partial avulsion and some flow to find new routes across alluvial fan.

Environmental designations (see Drawing 11.4.3.1 c, Catchment 52)	Ramsar	None	None
	SAC	River Spey	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey
		Drumochter Hills	Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 52	
	Is peat present in the catchment?	No	
	Is there a bog burst risk?	No	
	Current valley side or terrace erosion	Yes	
	Potential valley side or terrace erosion	Yes	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	Yes	
	Vertical incision present in catchment	No	
	Bank erosion/lateral migration	Yes	
	Unvegetated bars	Yes	
	Wooded/forested areas in catchment	Yes	Chance of floating debris blocking crossing
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 52)	Track crossing	
	Comment on sediment source potential in catchment	Debris flows and hillslope failure supply sediment to the channel Unvegetated bars close to the cross also provide a sediment source	
	Comment on sediment supply potential to crossing	Steep catchment with potential for hillslope failures to couple with channel. Catchment above the snow line so susceptible to high snowmelt discharges with potential to mobilise sediment	

Morphology and Process- Reach upstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Cobble and boulder	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	Low	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 52)	None	
	Impact of infrastructure	None	
	Channel realignment	Likely- but before OS mapping	

Morphology and Process- At crossing	Channel morphology	Plane bed	
	Predominant sediment size	Boulder to gravel	
	Estimated discharge at 1:200 event (m^3/s)	17.88	
	Unvegetated bars	Yes	
	Vertical incision	None	
	Deposition	Medium	
	Lateral migration/bank erosion	Low	
	Damaged/unstable drains or armouring	None	

Morphology and Process- Reach downstream of crossing	Channel morphology	Plane-Riffle	
	Predominant sediment size	Cobble and Gravel	
	Unvegetated bars	Yes	
	Vertical incision	Low	
	Deposition	Medium	
	Lateral migration/bank erosion	Low	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 52)	None	
	Impact of infrastructure	None	
	Channel realignment	Likely- but before OS mapping	
Summary behaviour	Sediment is available in the upper catchment and transported downstream, and deposited in bars, where slope reduces. This currently leaves unvegetated bars close to the crossing with the potential to be mobilised downstream during high flows. Bars increase potential of lateral and vertical movement. Catchment is susceptible to flooding from snow melt. Immediately upstream of the road the channel flows through its alluvial fan. At very high flows there is the risk of avulsion (full or partial channel abandonment) and finding new routes across the alluvial fan, towards crossings 53 and 54 and, possibly but much less likely towards crossing 55 and 56.		

Photograph 11.4.3.79-Downstream

Photograph 11.4.3.80- Upstream to crossing

Photograph 11.4.3.81- Upstream to wooded floodplain

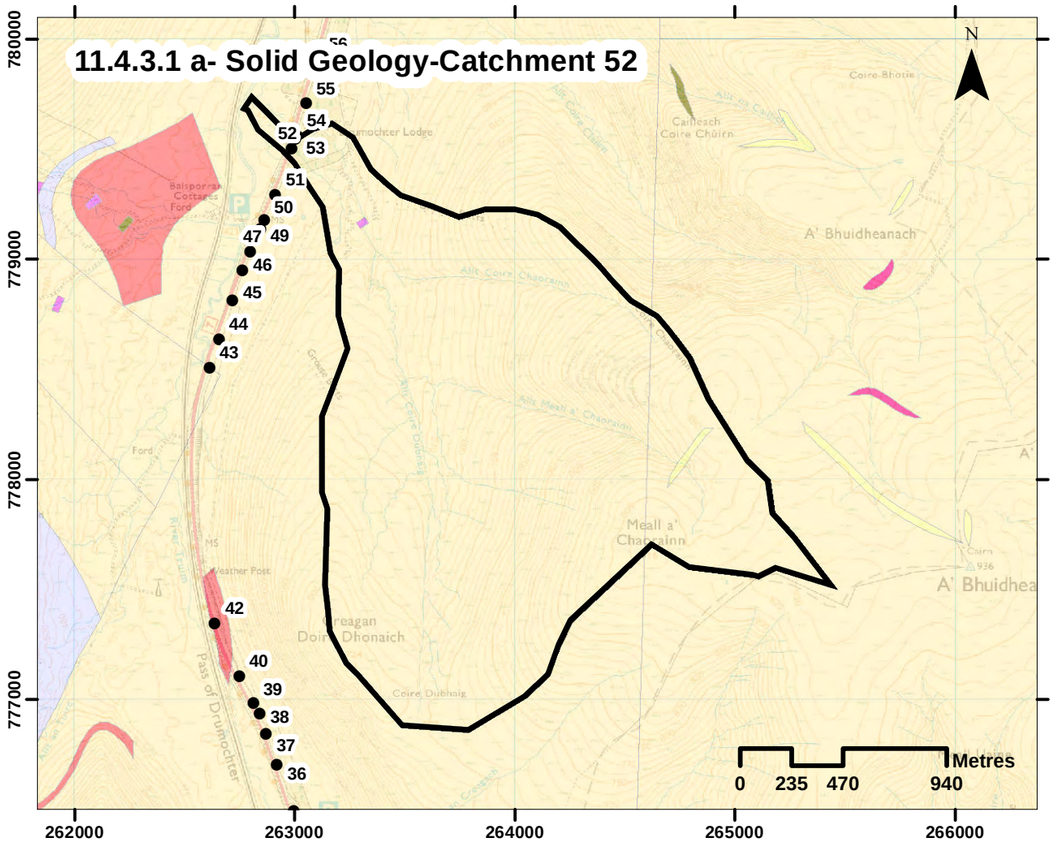
Photograph 11.4.3.82-Downstream into crossing- Gravel and cobble bed

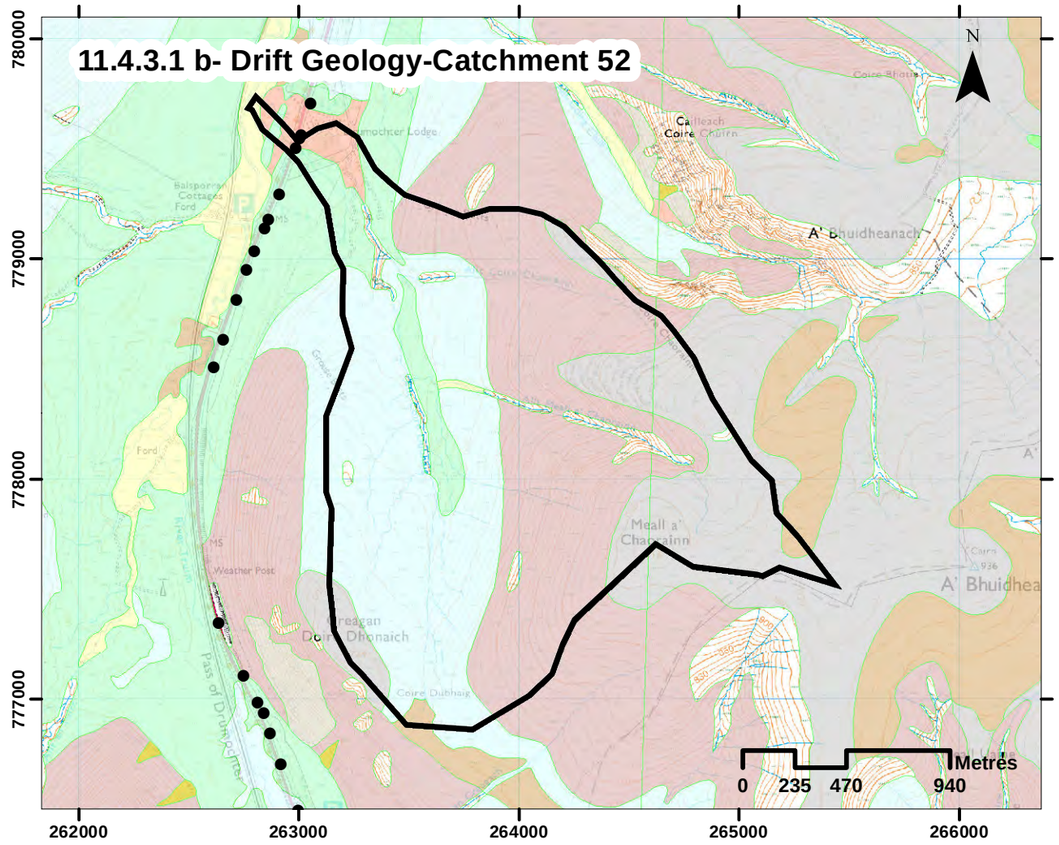
Photograph 11.4.3.83-Left bank

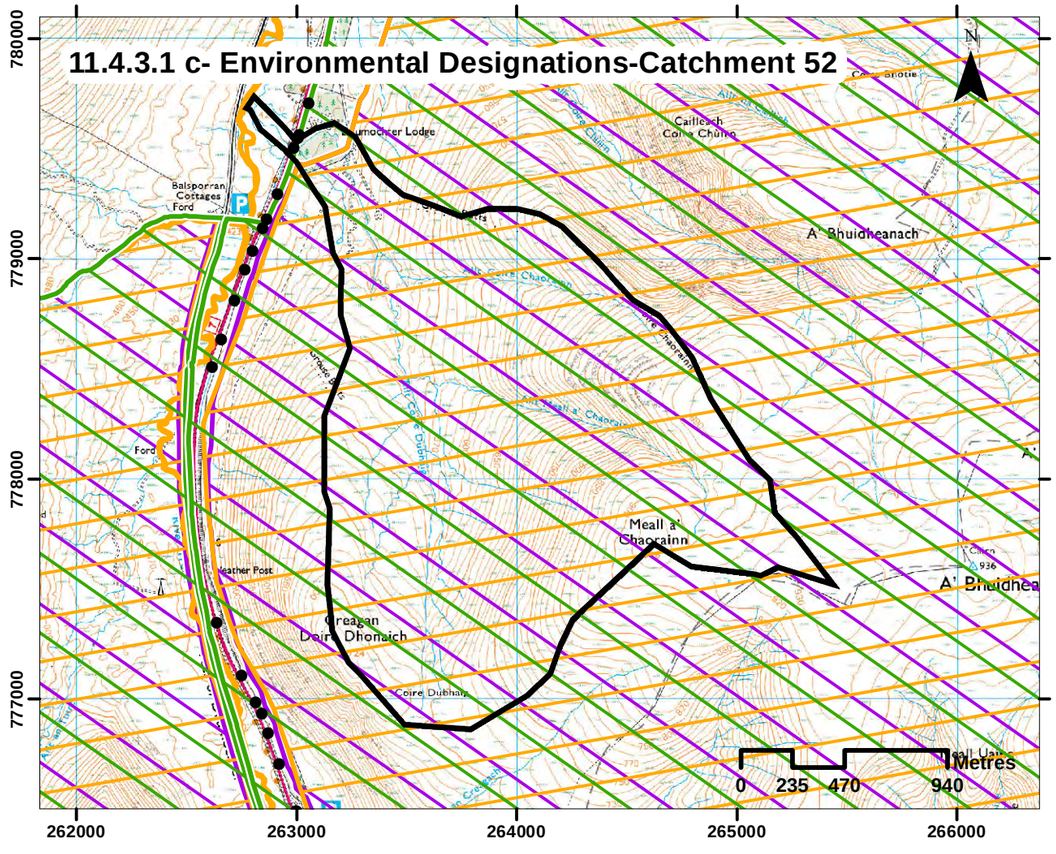
Photograph 11.4.3.84 -Upstream to plain bed channel through wooded floodplain

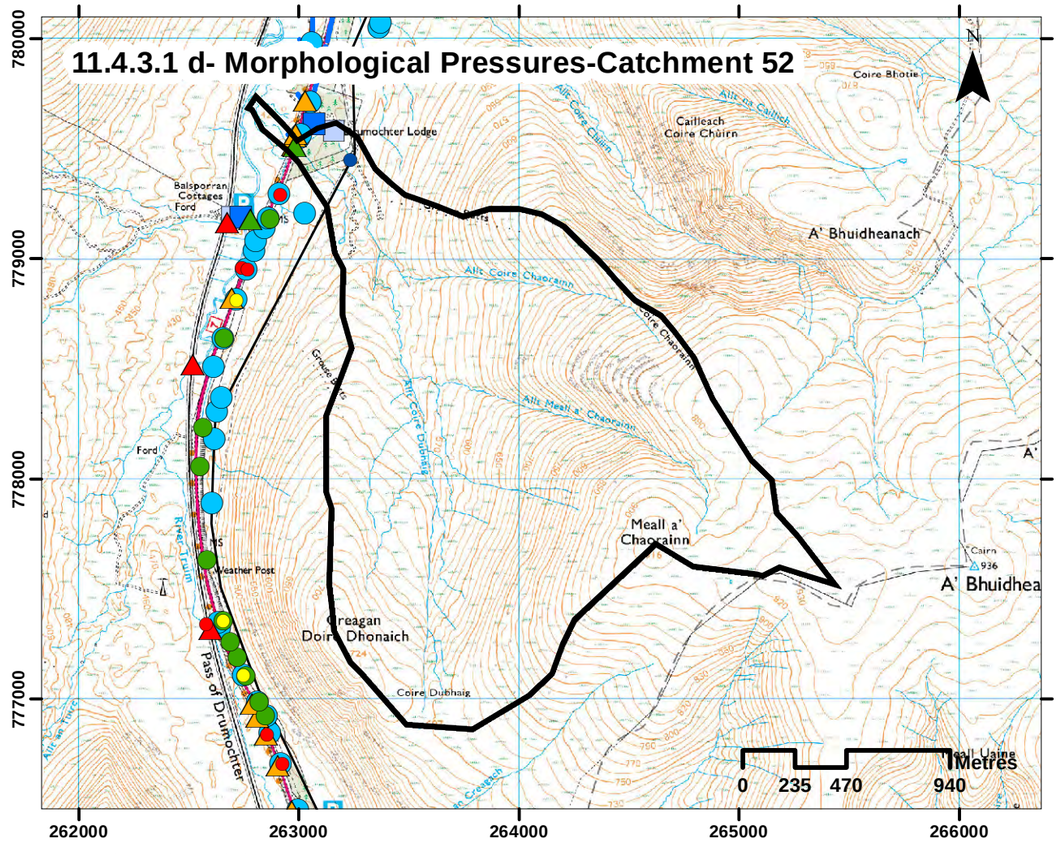
Photograph 11.4.3.85-Downstream to new bank protection

Photograph 11.4.3.86-Tributary inflow









Legend

General
- Crossing location

Solid Geology
- Gaick Psammite Formation - Psammite
- Scottish Highland Ordovician Minor Intrusion Suite - Pegmatite
- Vein-Quartz

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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Road Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Catchpit
- Ford
- Discharge Location
- Abstraction Location
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 52 Catchment Overview

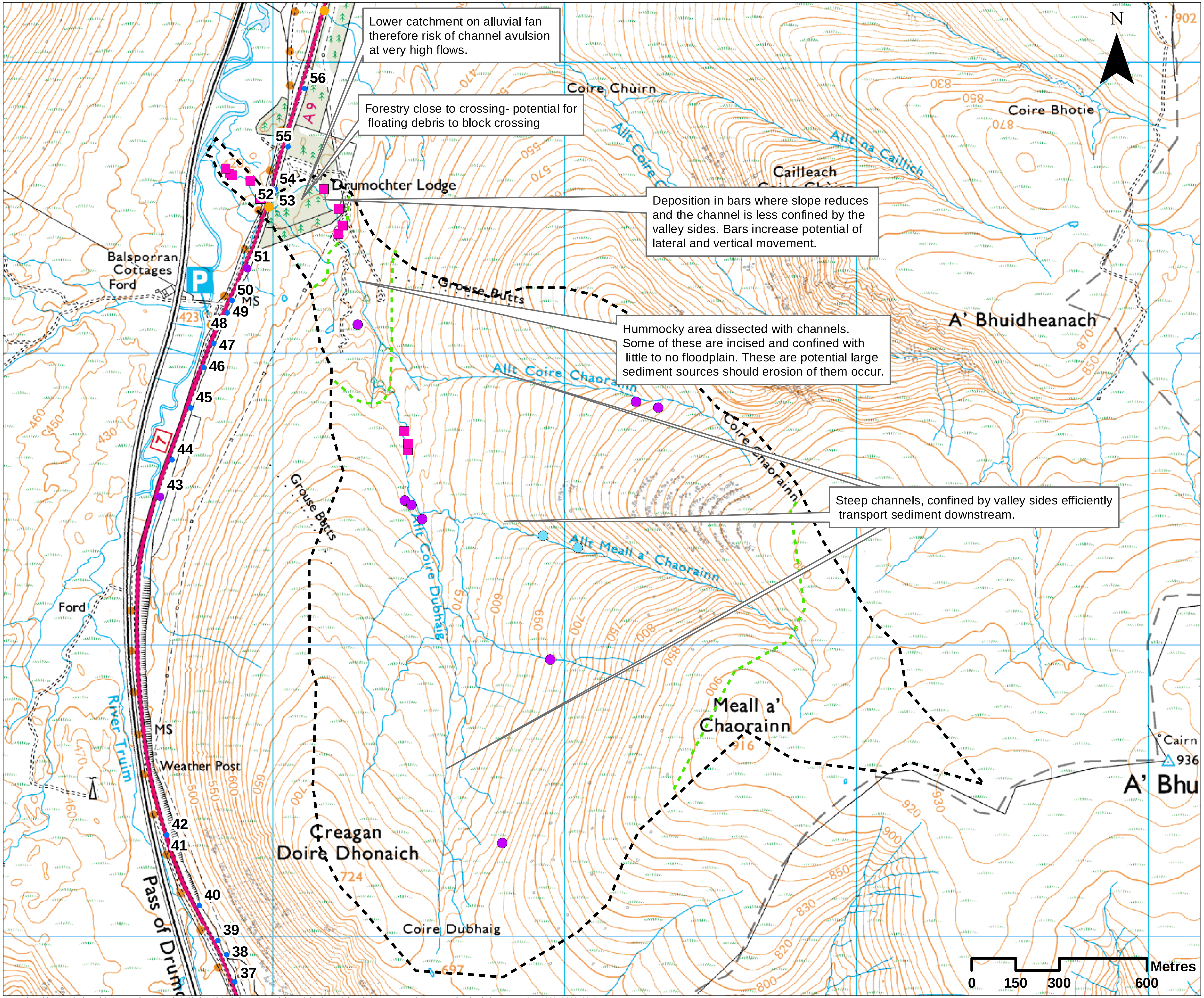
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

DATE: 18/07/2017

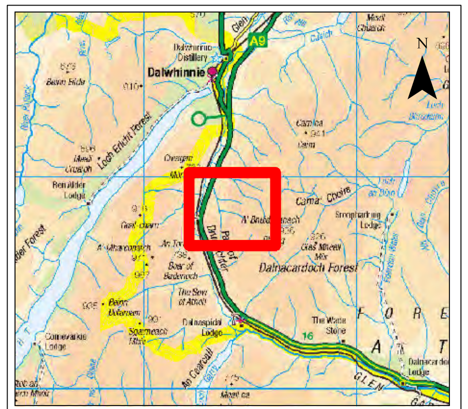
PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3



Lower catchment on alluvial fan therefore risk of channel avulsion at very high flows.
Forestry close to crossing- potential for floating debris to block crossing
Deposition in bars where slope reduces and the channel is less confined by the valley sides. Bars increase potential of lateral and vertical movement.
Hummocky area dissected with channels. Some of these are incised and confined with little to no floodplain. These are potential large sediment sources should erosion of them occur.
Steep channels, confined by valley sides efficiently transport sediment downstream.
Drumochter Lodge
Balsporran Cottages
Ford
Coire Chùirn
Coire Bhotie
Allt Coire Chùirn
Allt na Caillich
Cailleach
A' Bhuidheanach
Grouse Butts
Allt Coire Chaorainn
Coire Chaorainn
Allt Meall a' Chaorainn
Allt Coire Dubhaig
Meall a' Chaorainn
Creagan Doire Dhonaich
Coire Dubhaig
River Truim
Weather Post
Pass of Drum
Cairn
A' Bhu
A 9
MS
N
Metres
0
150
300
600



Legend

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 52 Baseline Assessment

DESIGN: EL	DRAWN: EL	CHK: AB	APP: EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET: 1 OF 1	REVISION: C01	SUITABILITY: A3

Annex 11.4.3 - Hydromorphological Catchment Assessment - 57

Catchment No.	**57**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Major

Quantitative Spatial Elements	Catchment Area (km^2)	0.7
	Average slope in catchment (°)	12
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 57)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	Lower catchment (u/s of road) is part of the Allt Coire Chùirn alluvial fan

Environmental designations (see Drawing 11.4.3.1 c, Catchment 57)	Ramsar	No	
	SAC	River Spey	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey
		Drumochter Hills	Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

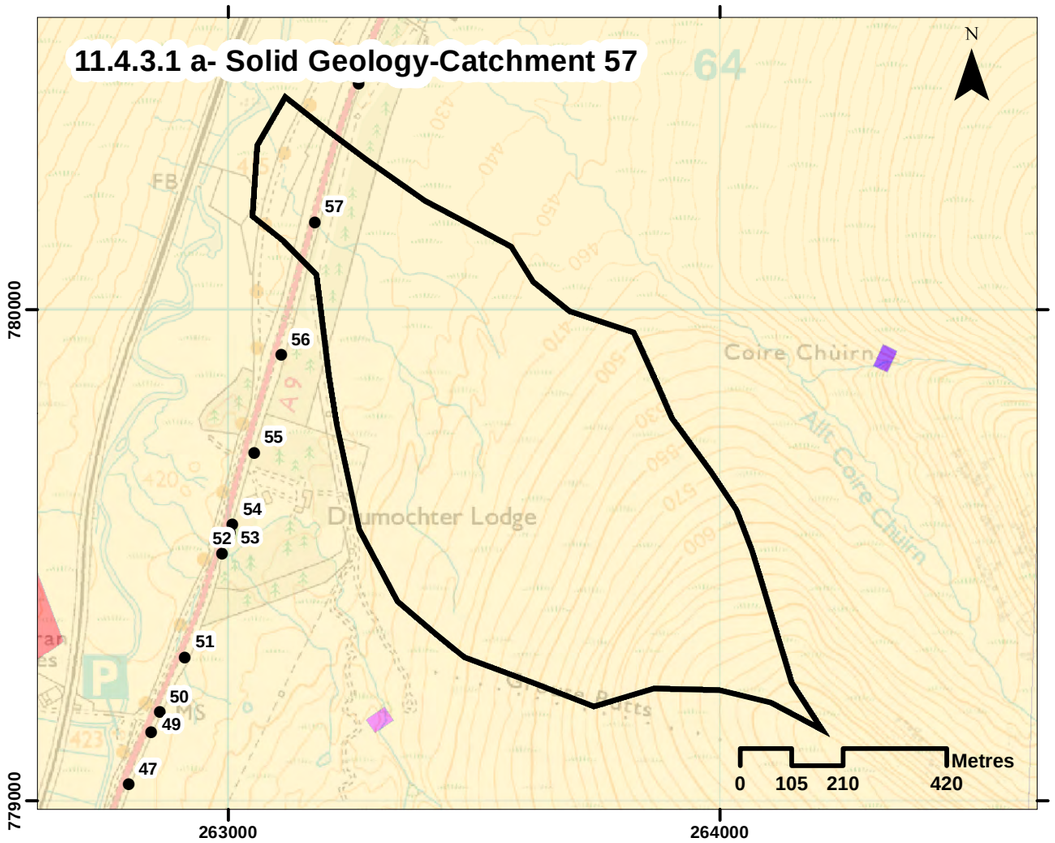
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 57	
	Is peat present in the catchment?	No	
	Is there a bog burst risk?	No	
	Current valley side or terrace erosion	No	
	Potential valley side or terrace erosion	Yes	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	No	
	Vertical incision present in catchment	Yes	Yes but at a low level- limited sediment supply to channel
	Bank erosion/lateral migration	No	
	Unvegetated bars	No	
	Wooded/forested areas in catchment	Yes	Potential for floating debris blocking crossing
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 57)	None	
	Comment on sediment source potential in catchment	Sediment is available in the catchment but it is not currently coupled with the	
	Comment on sediment supply potential to crossing	Steep and confined channels will transport sediment downstream	

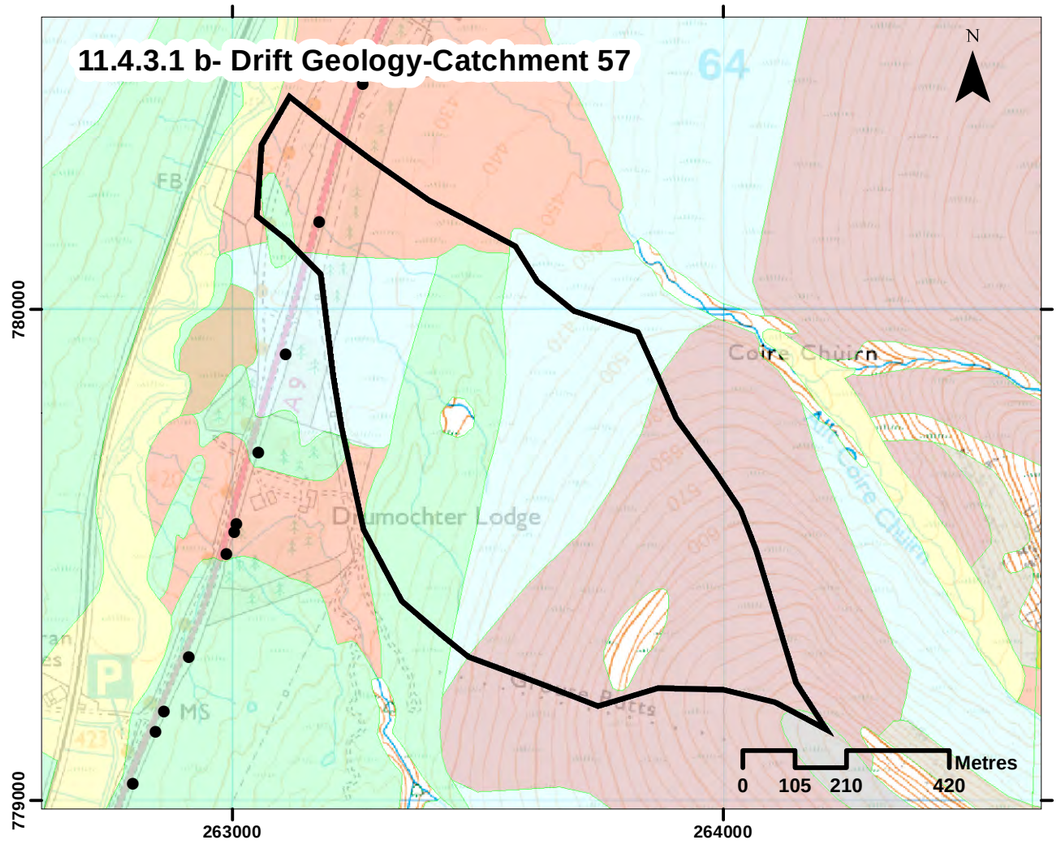
Morphology and Process- Reach upstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Boulder to gravel	
	Unvegetated bars	No	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	Low	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 57)	Track crossing	
	Impact of infrastructure	Incision downstream	Sediment source
	Channel realignment	Unclear	

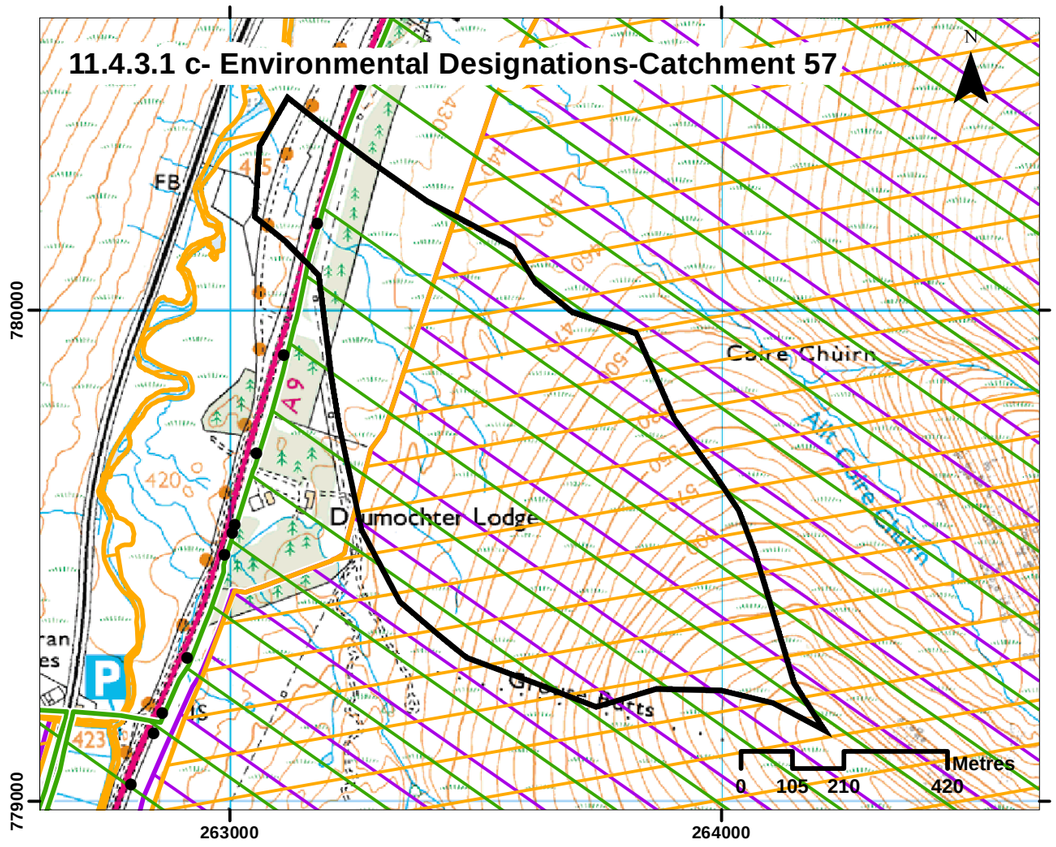
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	None	
	Estimated discharge at 1:200 event (m^3/s)	4.15	Need to consider possibility of flow being received from Allt Coire Chùirn in extreme events
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

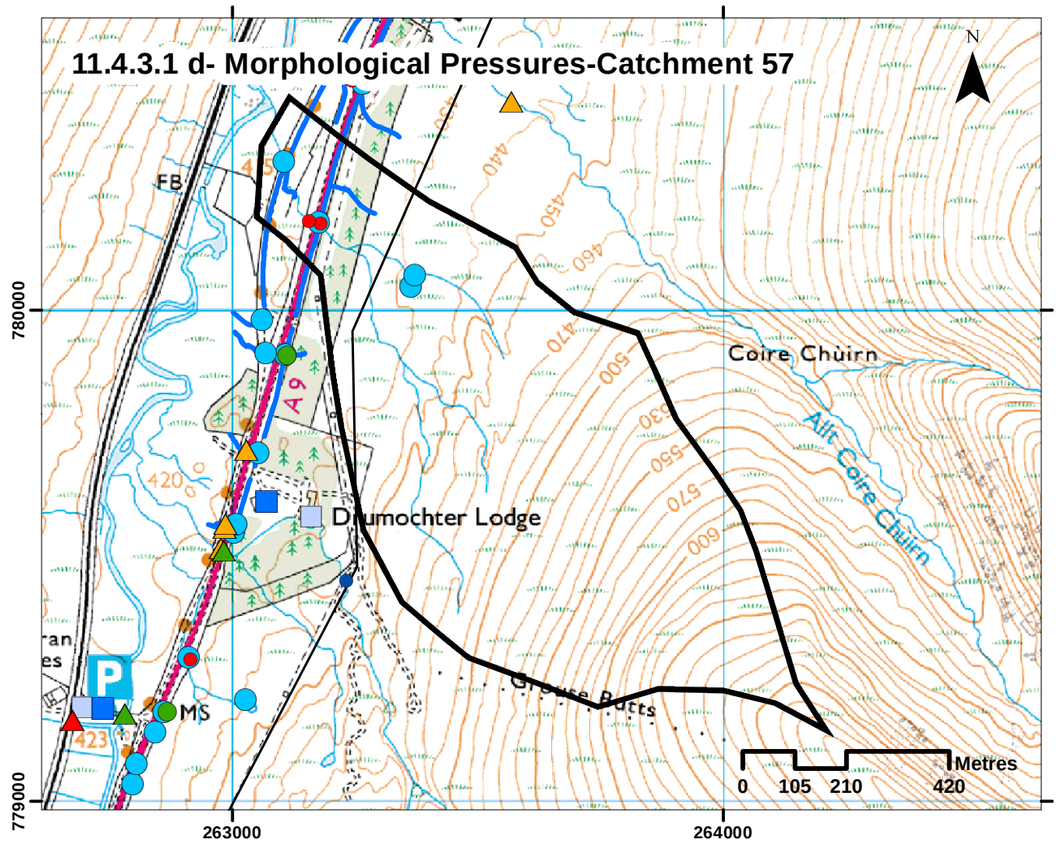
Morphology and Process- Reach downstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Gravel	
	Unvegetated bars	Yes-small	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 57)	NMU crossing	
	Impact of infrastructure	None	
	Channel realignment	Unclear- may be natural change on channel position	

Summary behaviour	Sediment is available in the catchment but it is not currently coupled with the channel. Channel is incised and confined by valley sides in some locations with potential for erosion and sediment delivery in the future. Confined channels have potential to be a future sediment source through erosion. Channel currently stable. Several drains also drain into the crossing. Channel crosses very large Allt Coire Chùirn alluvial fan and therefore there is a risk of receiving some flow from Allt Coire Chùirn in extreme events, but there is no morphological evidence in aerial photos for a recent event of this nature in this part of the fan.









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Railway Bridge
- Road Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Ford
- Discharge Location
- Abstraction Location
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 57 Catchment Overview

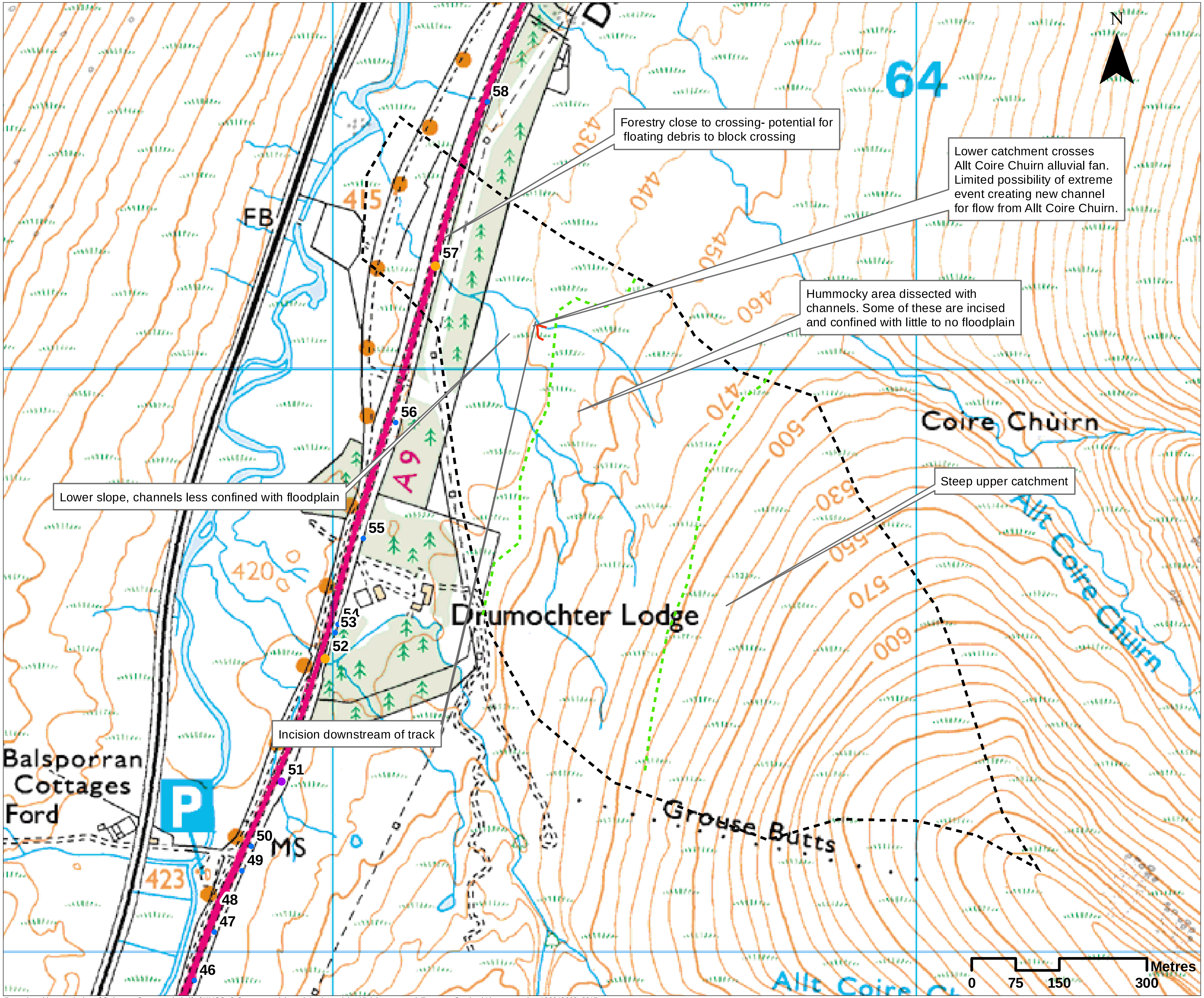
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

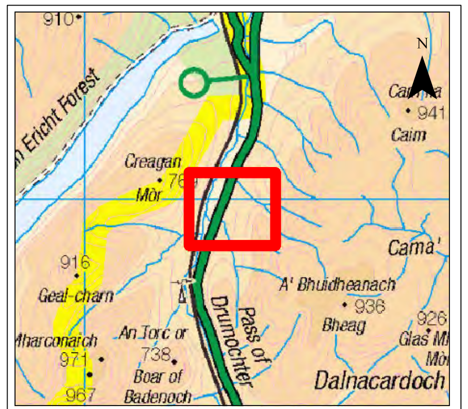
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Major crossing
- Minor crossing
- Other crossing
- Break in slope
- Incision
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m· 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

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 57 Baseline Assessment

DESIGN: EL	DRAWN: EL	CHK: AB	APP: EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET: 1 OF 1	REVISION: C01	SUITABILITY: A3

Annex 11.4.3 - Hydromorphological Catchment Assessment - 59

Catchment No.	**59**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Major

Quantitative Spatial Elements	Catchment Area (km^2)	3.49
	Average slope in catchment (°)	15
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 59)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	Major alluvial fan present in lower catchment (crossing cuts through it)

Environmental designations (see Drawing 11.4.3.1 c, Catchment 59)	Ramsar	No	
	SAC	River Spey	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey
		Drumochter Hills	Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 59	
	Is peat present in the catchment?	Yes	Some peat in upper catchment
	Is there a bog burst risk?	Yes	But unlikely. Risk small relative to other risks associated with high mineral sediment delivery and mobility
	Current valley side or terrace erosion	Yes	Supplying sediment to channel
	Potential valley side or terrace erosion	Yes	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	Yes	High sediment supply to channel
	Vertical incision present in catchment	Yes	In steeper areas upstream
	Bank erosion/lateral migration	Yes	Laterally mobile channel on lower slopes
	Unvegetated bars	Yes	High sediment supply potential to crossing
	Wooded/forested areas in catchment	Yes	Potential for floating debris blocking crossing
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 59)	Foot bridge near crossing	
	Comment on sediment source potential in catchment	High sediment source potential from coupled hillslope failure and valley side erosion in steep upper catchment	
	Comment on sediment supply potential to crossing	Steep confined channel delivers sediment to lower gradient area (alluvial fan) upstream of crossing, where deposition forming bars occurs	

Morphology and Process- Reach upstream of crossing	Channel morphology	Wandering	
	Predominant sediment size	Cobbles and gravels	
	Unvegetated bars	Yes	Extensive coarse sediment available
	Vertical incision	Low	
	Deposition	High	
	Lateral migration/bank erosion	Medium	Within confines of terraces
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 59)	Foot bridge	
	Impact of infrastructure	Fixing bank location	
	Channel realignment	Possible straightening upstream	

Morphology and Process- At crossing	Channel morphology	Plane bed	
	Predominant sediment size	Cobbles and gravels	
	Estimated discharge at 1:200 event (m^3/s)	16.42	
	Unvegetated bars	Yes	
	Vertical incision	Low	
	Deposition	High	
	Lateral migration/bank erosion	Medium	
	Damaged/unstable drains or armouring	None	

Morphology and Process- Reach downstream of crossing	Channel morphology	Wandering	
	Predominant sediment size	Cobbles and gravels	
	Unvegetated bars	Yes	
	Vertical incision	Medium	
	Deposition	High	
	Lateral migration/bank erosion	Medium	Within confines of terraces
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 59)	Yes	NMU route and structure of unknown purpose (possibly containing utilities)
	Impact of infrastructure	Yes	Fixes bank position. Restricts passage of sediment, particularly the 'unknown' structure (evidence in aerial photos for some dredging of channel u/s of this structure).
	Channel realignment	Channel straightened downstream	
Summary behaviour	Extensive sediment supply from upper catchment is transported through steep gradient channels and deposited where slope reduces on a major alluvial fan. Currently most of this is within the channel which contributes to the channel's lateral mobility. This in turn leads to reworking of the alluvial fan sediments and further sediment production. Structures across the channel create pinch points where the channel banks are more or less fixed and passage of sediment and debris is restricted, evidenced by the sediment which has needed to be dredged and placed either side of the channel to maintain flow under the structures. The majority of the alluvial fan formation probably took place during deglaciation in the early Holocene, but there is relatively recent morphological evidence for avulsion events and alternative major channels through the alluvial fan. Consideration needs to be given to the risk of flow taking an alternative route from the apex of the alluvial fan to the Truim particular a more northerly one (i.e. towards crossings 60, 61 and 62).		

Photograph 11.4.3.87- Upstream towards crossing

Photograph 11.4.3.88- Erosion of right bank

Photograph 11.4.3.89 -Steep catchment upstream

Deposition

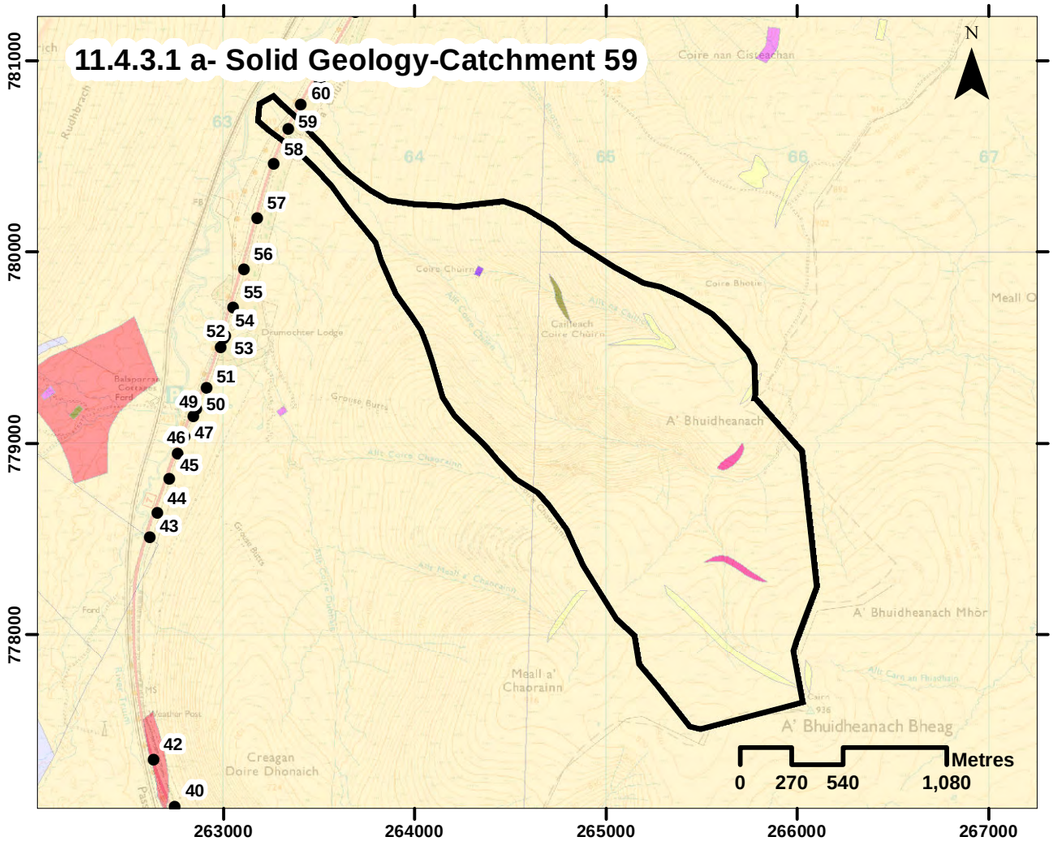
Photograph 11.4.3.90- Unknown structure crossing downstream

Photograph 11.4.3.91- Downstream to crossing

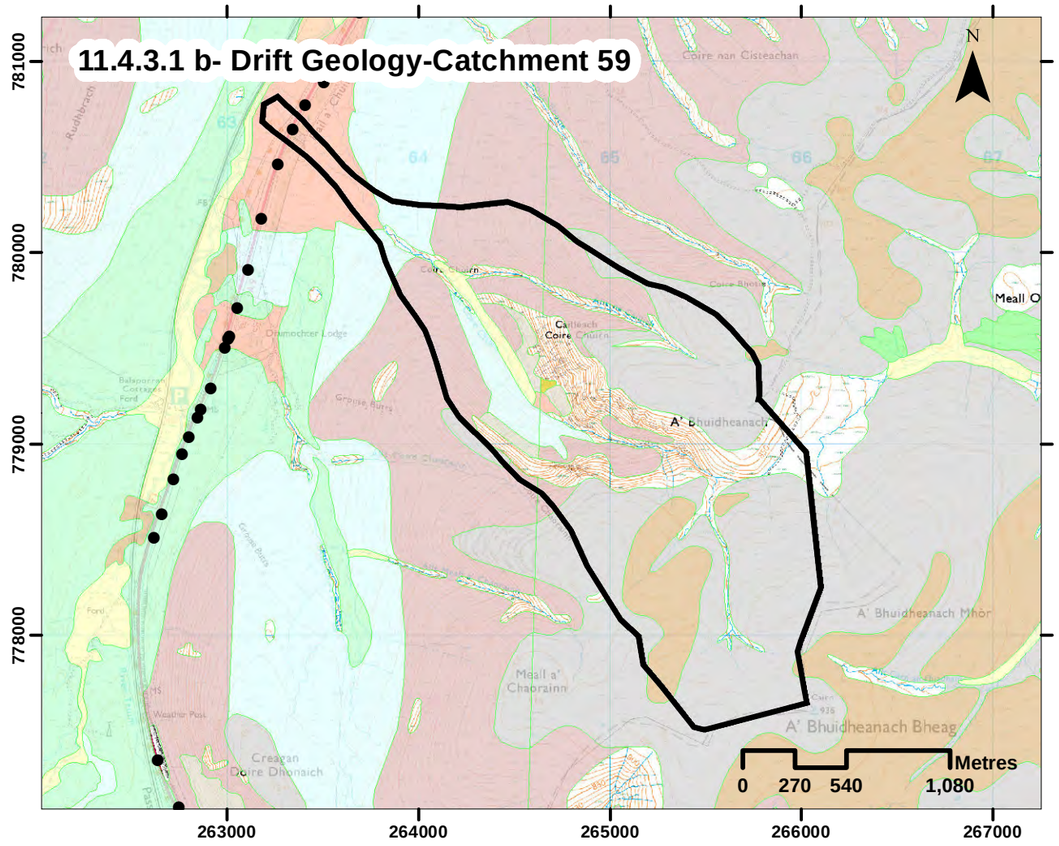
Photograph 11.4.3.92- Bed sediment (Cobbles and boulders)

Photograph 11.4.3.93- Deposition upstream of crossing

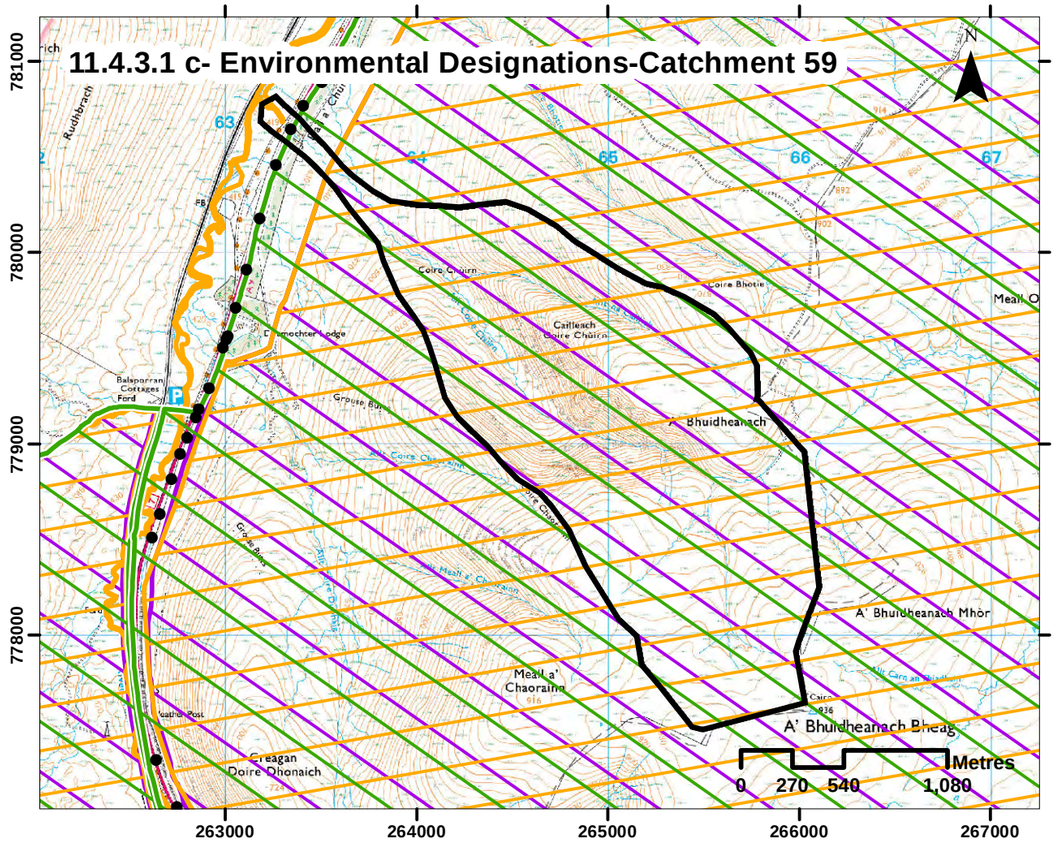
11.4.3.1 a- Solid Geology-Catchment 59



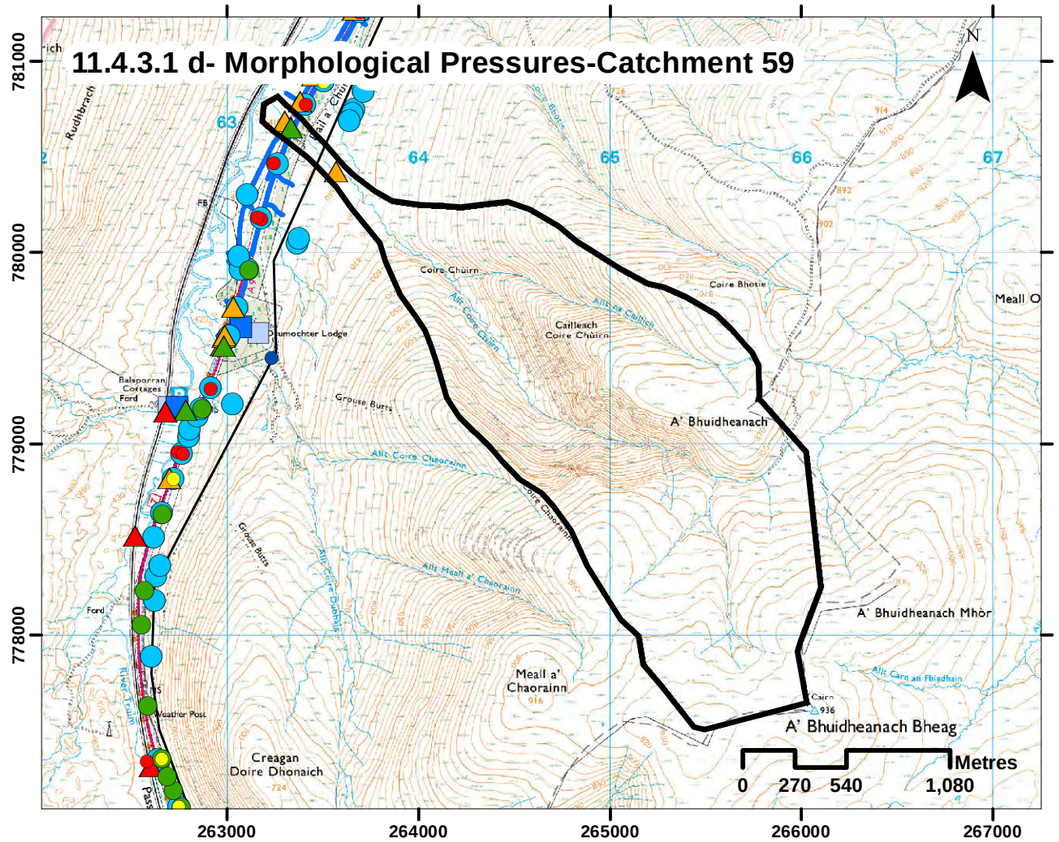
11.4.3.1 b- Drift Geology-Catchment 59



11.4.3.1 c- Environmental Designations-Catchment 59



11.4.3.1 d- Morphological Pressures-Catchment 59



Legend

General

- Crossing location

Solid Geology

- Gaick Psammite Formation - Psammite
- Scottish Highland Siluro-Devonian Calc-Alkaline Minor Intrusion Suite-Lamprophyres
- North Britain Siluro-Devonian Calc-Alkaline Dyke Suite - Microdioritic-Rock
- Scottish Highland Siluro-Devonian Calc-Alkaline Minor Intrusion Suite-Microgranite, Porphyritic
- Vein-Quartz

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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures

- Railway Bridge
- Road Bridge
- Track/Footbridge
- Culvert
- Cascade
- Step in Bed
- Catchpit
- Ford
- Discharge Location
- Abstraction Location
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 59 Catchment Overview

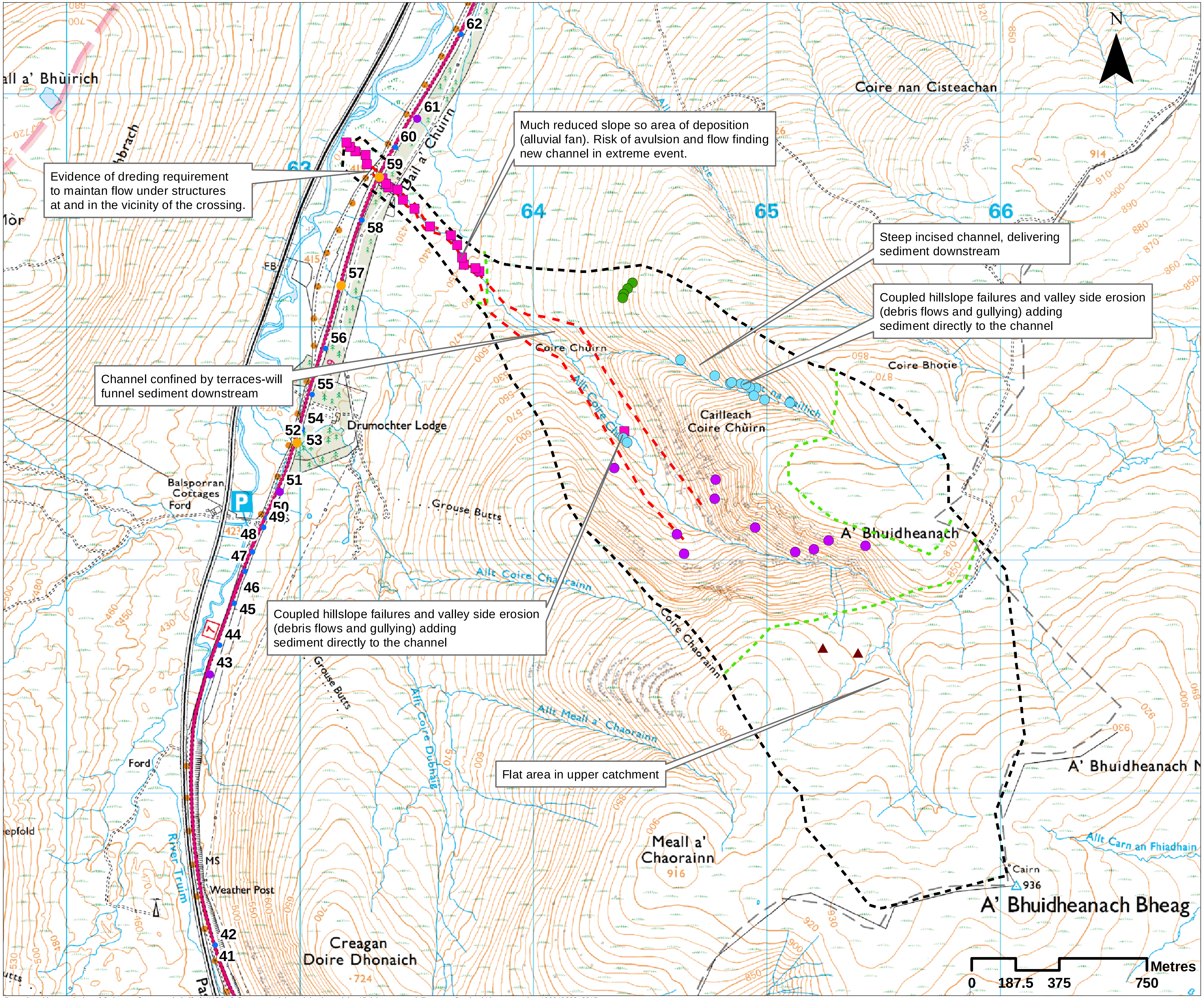
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

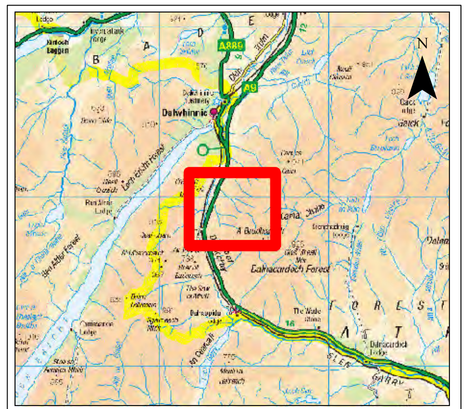
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Major crossing
- Minor crossing
- Other crossing
- Peat
- Coupled debris flow
- Debris flow
- Valley side erosion
- Unvegetated bar
- Break in slope
- Terrace
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m· 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 59 Baseline Assessment

DESIGN: EL	DRAWN: EL	CHK: AB	APP: EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET: 1 OF 1	REVISION: C01	SUITABILITY: A3

Annex 11.4.3 - Hydromorphological Catchment Assessment - 61

Catchment No.	**61**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Minor

Quantitative Spatial Elements	Catchment Area (km^2)	0.2
	Average slope in catchment (°)	10
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 61)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	Channel is effectively either high flow distributary or former course of the Allt a Chùirn (probably the former) which diverges from the main channel at the alluvial fan apex

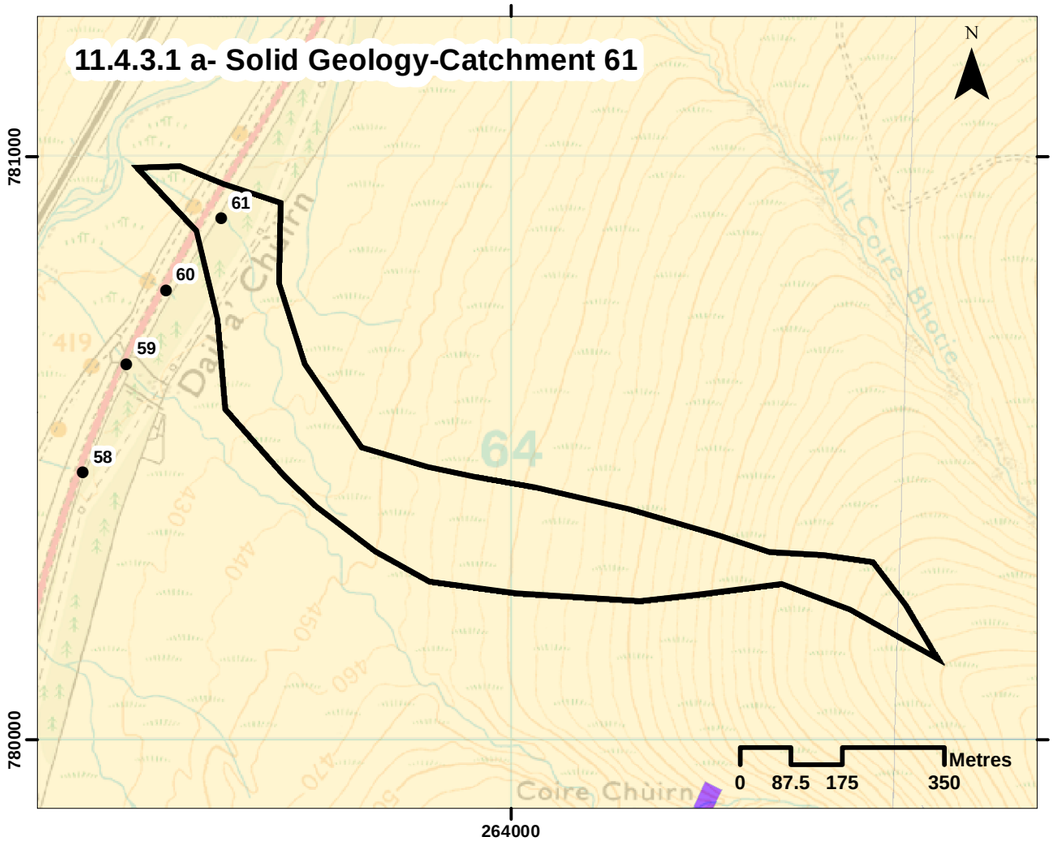
Environmental designations (see Drawing 11.4.3.1 c, Catchment 61)	Ramsar	No	
	SAC	River Spey Drumochter Hills	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

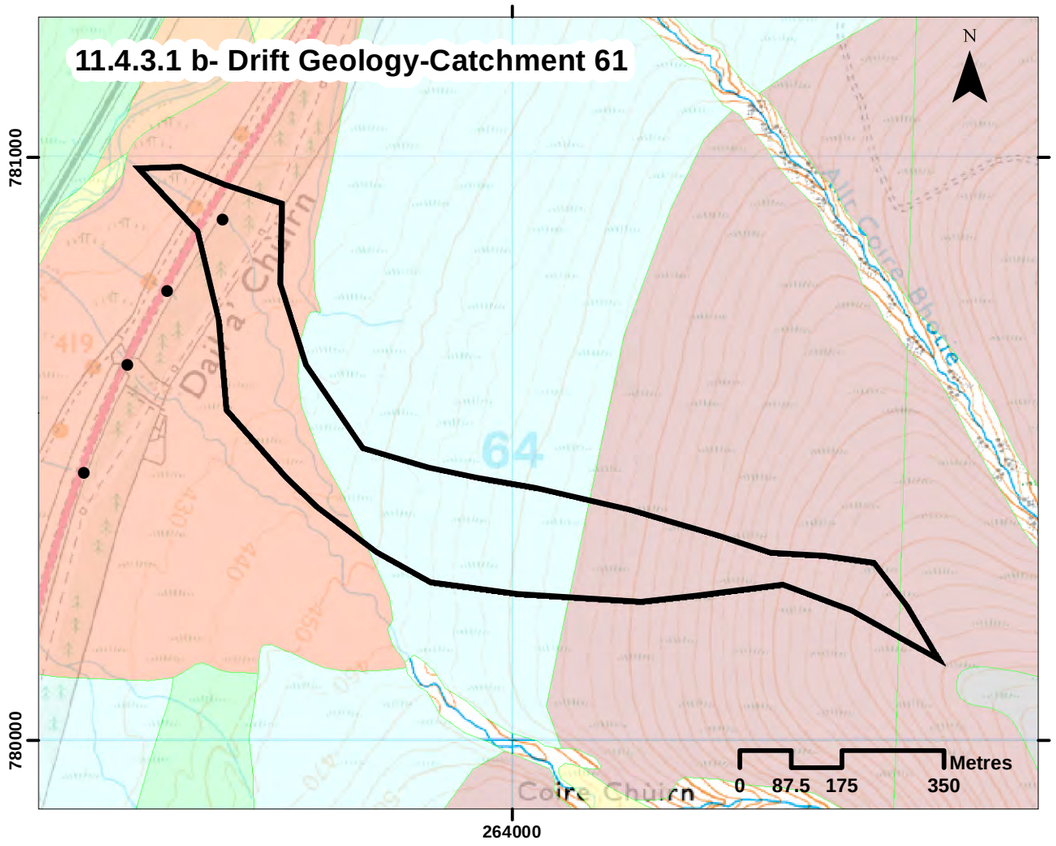
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 61	
	Is peat present in the catchment?	None	
	Is there a bog burst risk?	None	
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	None	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	None	
	Vertical incision present in catchment	None	
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	Yes	Chance of floating debris reaching crossing
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 61)	None	
	Comment on sediment source potential in catchment	Sediment is available within the catchment but its not coupled with the channel, slowing the speed to sediment delivery to the crossing.	
	Comment on sediment supply potential to crossing	Limited source in proximity of channel, channel is steep so will move sediment quickly should it enter. Possibility that channel will receive flow and sediment from Allt a Chùirn catchment at high flows	

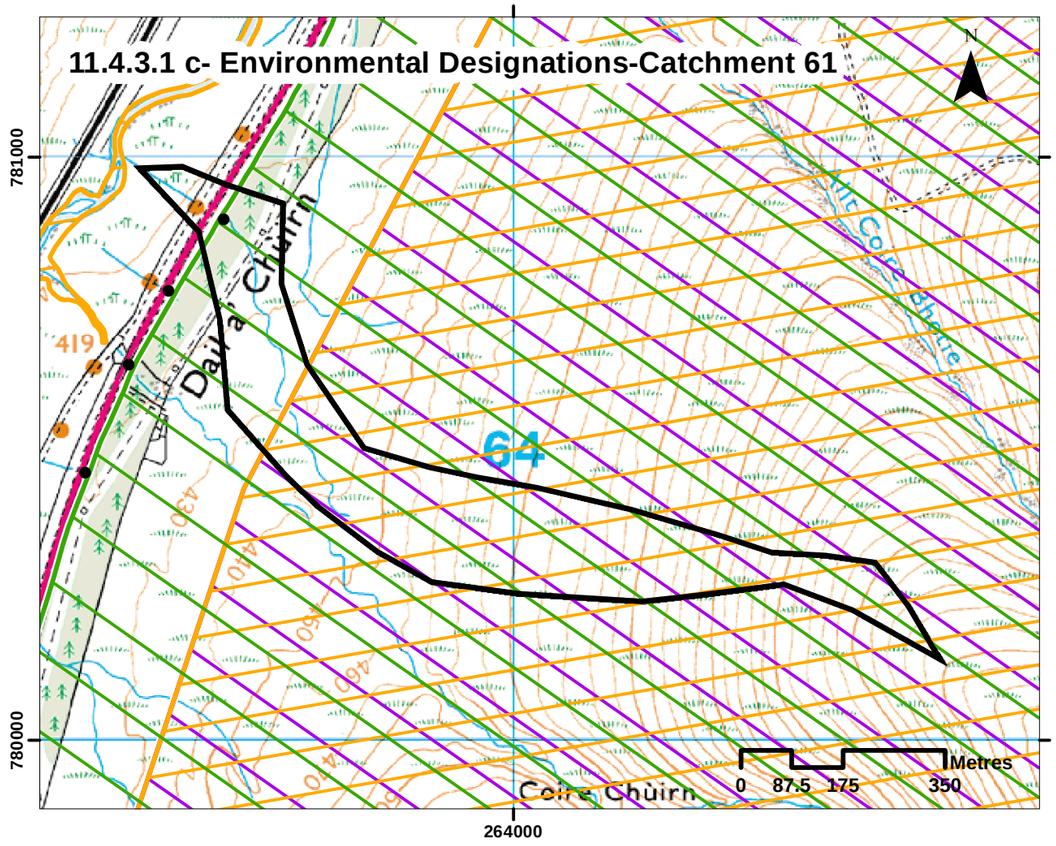
Morphology and Process- Reach upstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	None	
	Unvegetated bars	No	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 61)	None	
	Impact of infrastructure	None	
	Channel realignment	Yes	Local

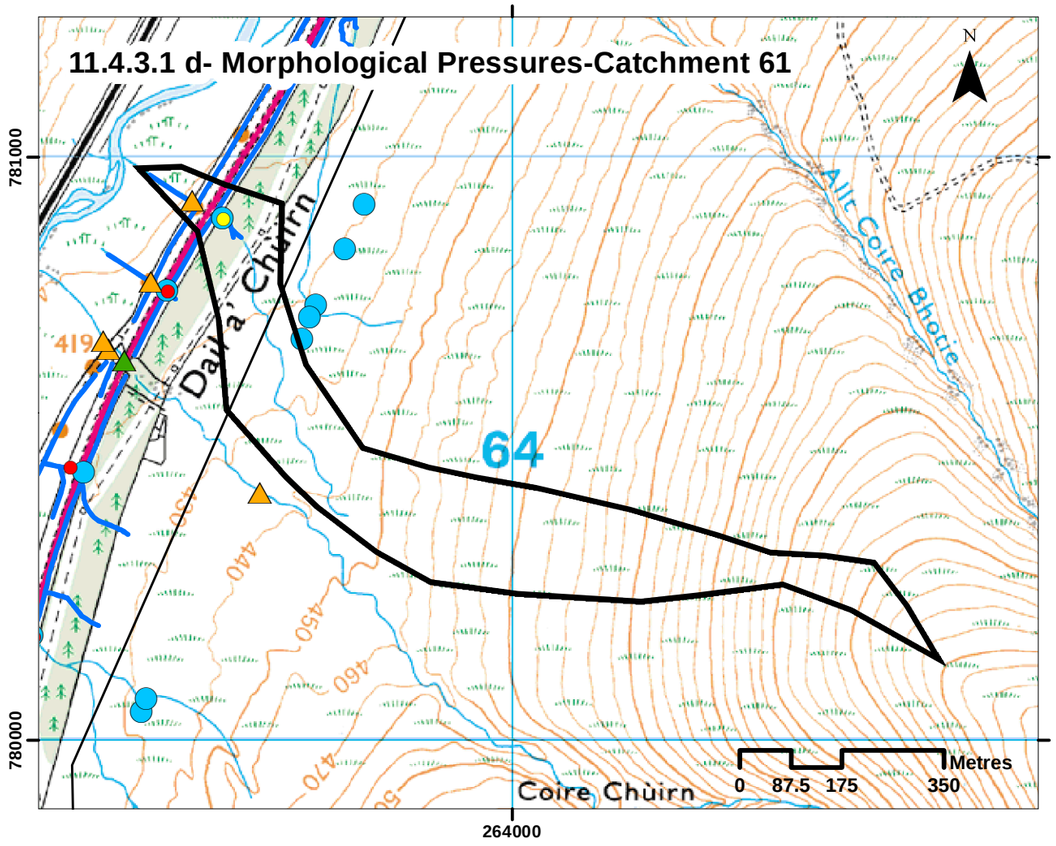
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	N/A	
	Estimated discharge at 1:200 event (m^3/s)	0.94	Need to consider channel 62 acting as a high flow distributary channel for the Allt a Chùirn and therefore higher flow volumes and sediment
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

Morphology and Process- Reach downstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	None visible	
	Unvegetated bars	None	
	Vertical incision	Low	Signs of some vertical incision, probably related to straightening.
	Deposition	None	
	Lateral migration/bank erosion	Low	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 61)	None	
	Impact of infrastructure	None	
	Channel realignment	Yes	Straightening
Summary behaviour	Signs of some vertical incision, probably related to straightening downstream of the crossing. Most important consideration is that the channel 'source' is at the apex of the Allt a Chùirn alluvial fan making it highly probably that in extreme events this channel could receive flows from the major Allt a Chùirn (crossing 59) catchment. The morphological evidence (clearly visible channel features with only short vegetation) in the upper part of the alluvial fan indicate it may have been active as such relatively recently. As such a crossing to accommodate higher discharges than might be suggested based on the size of catchment 61 are advisable.		









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Road Bridge
- Track/Footbridge
- Culvert
- Step in Bed
- Catchpit
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 61 Catchment Overview

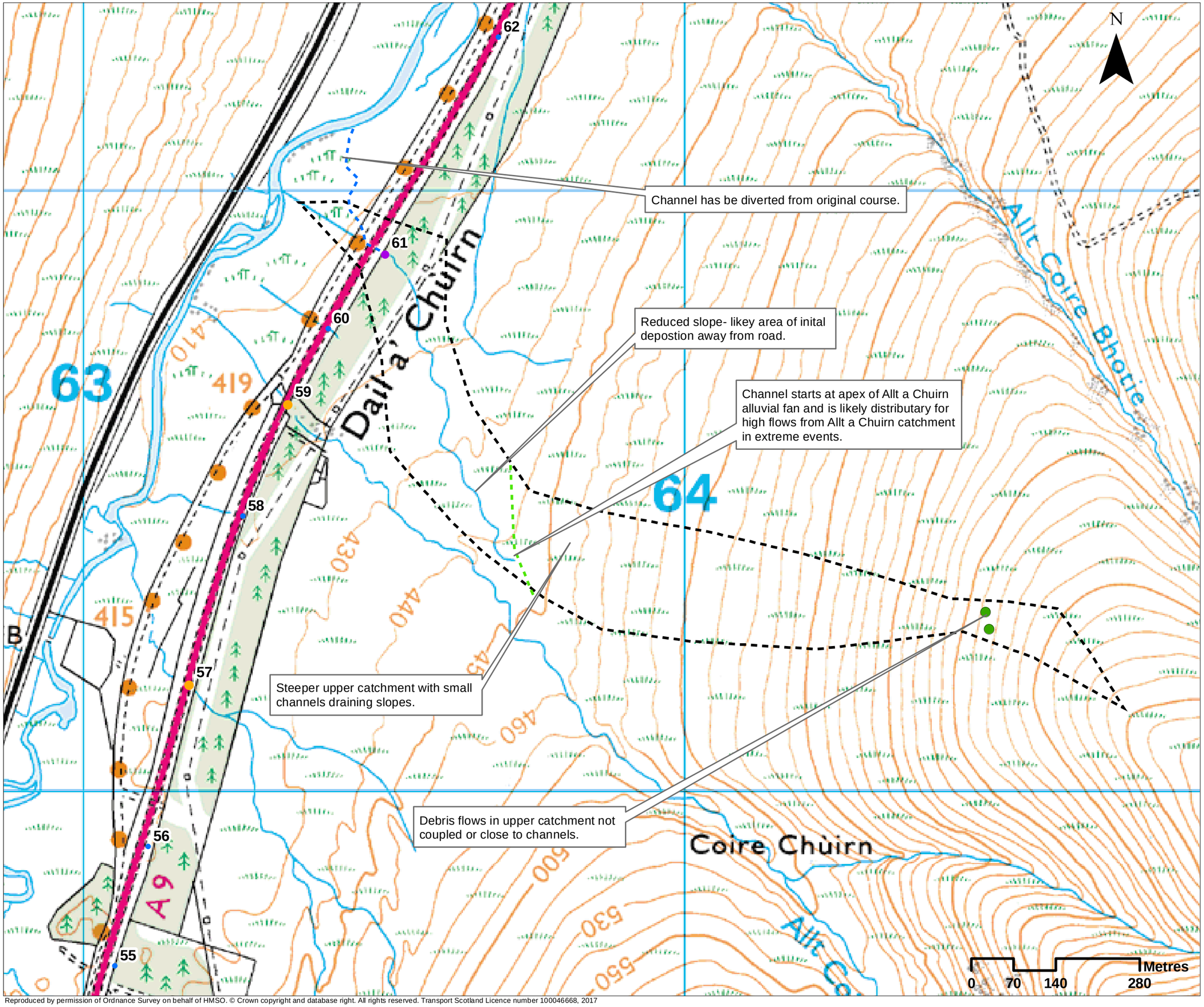
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

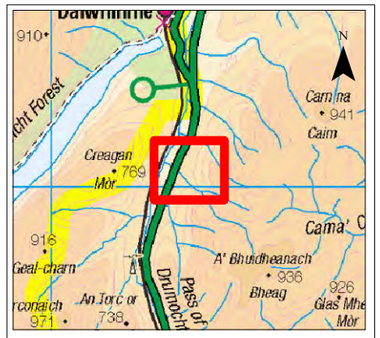
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Major crossing
- Minor crossing
- Other crossing
- Debris flow
- Break in slope
- Original channel
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m. 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

TRANSPORT SCOTLAND — A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 61 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: \\BIXXFP01\Proj\Transportation\TNXUGM - TQ Business Development\Small Projects\A9\GIS\Maps\Detailed assessment maps\Assessment 61.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 62

Catchment No.	**62**
Catchment Name	-

Channel Nature	Nature of water course	Drain
	Size of water course	Other

Quantitative Spatial Elements	Catchment Area (km^2)	0.05
	Average slope in catchment (°)	2
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 62)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	Catchment is on northern edge of Allt a Chùirn catchment alluvial fan.

Environmental designations (see Drawing 11.4.3.1 c, Catchment 62)	Ramsar	No	
	SAC	River Spey Drumochter Hills	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

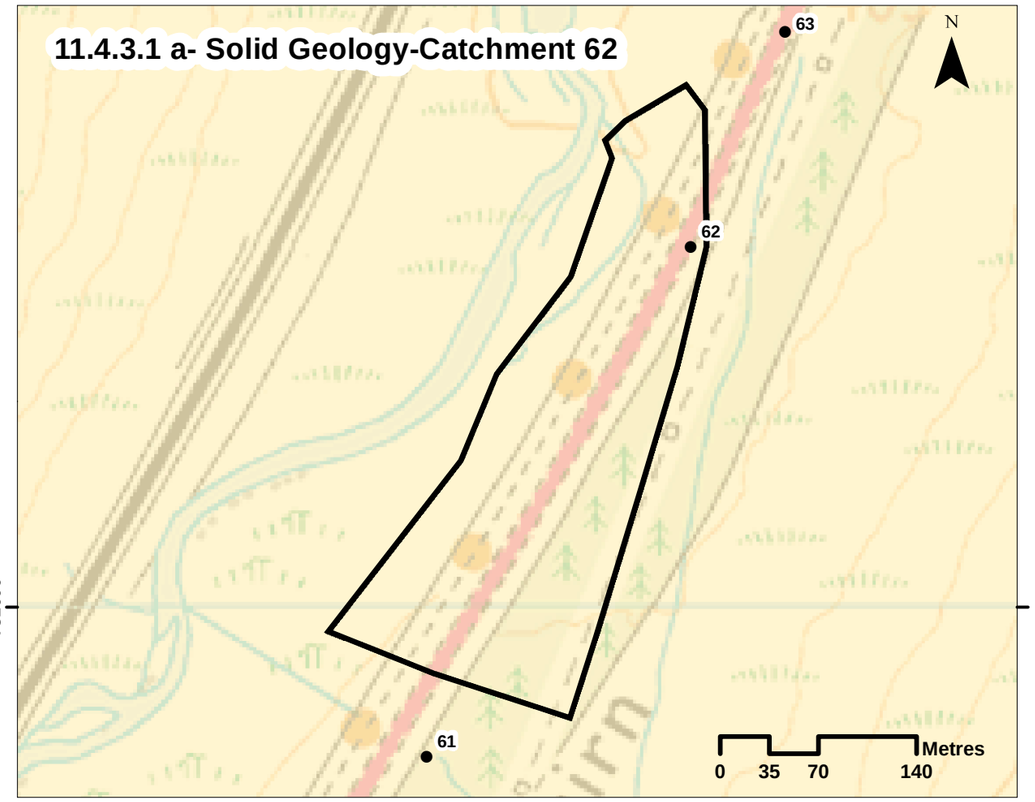
Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 62	
	Is peat present in the catchment?	None	
	Is there a bog burst risk?	None	
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	None	
	Hill slope failures (including peat slides and debris flows and slides)	None	
	Hill slope failures coupled to channel	None	
	Vertical incision present in catchment	None	
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	Yes	Potential for floating debris
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 62)	None	
	Comment on sediment source potential in catchment	No direct sediment supply to channel, yet drain has an apparently natural bed. Some of this may have arisen from erosion where channel bends to become road-parallel but more likely just the alluvial fan material into which the drain is cut	
	Comment on sediment supply potential to crossing	Low slope so slow transfer of sediment downstream	

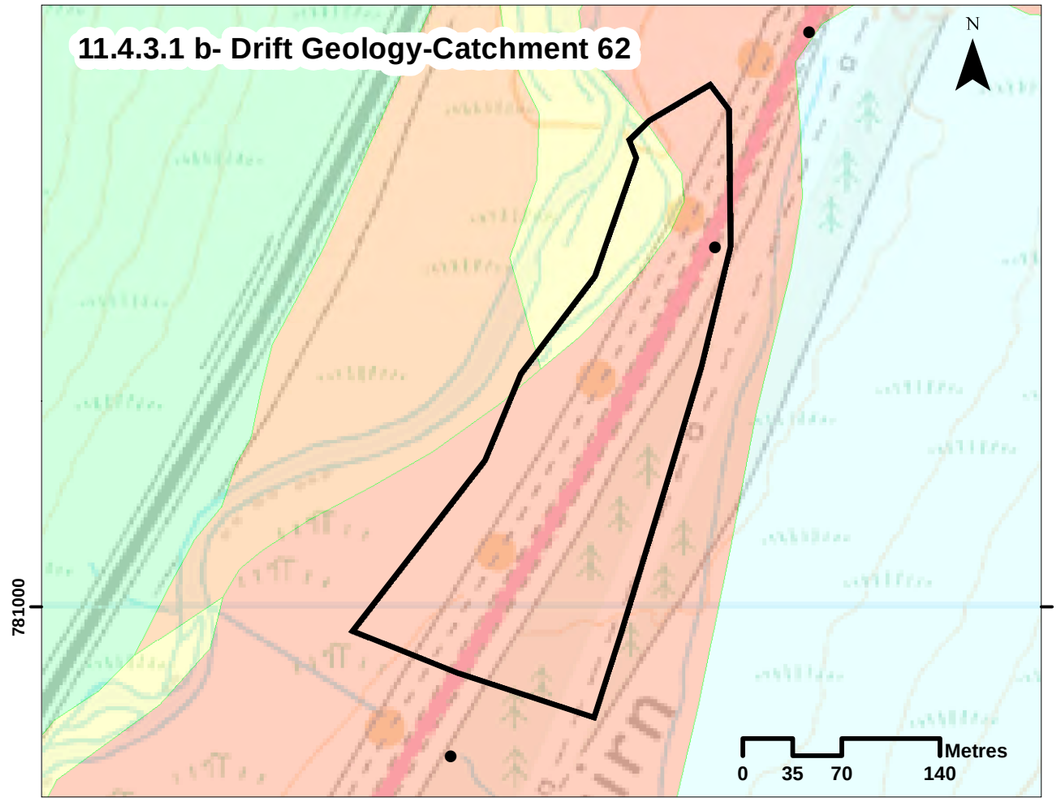
Morphology and Process- Reach upstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Gravel	
	Unvegetated bars	No	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 62)	None	
	Impact of infrastructure	None	
	Channel realignment	None	

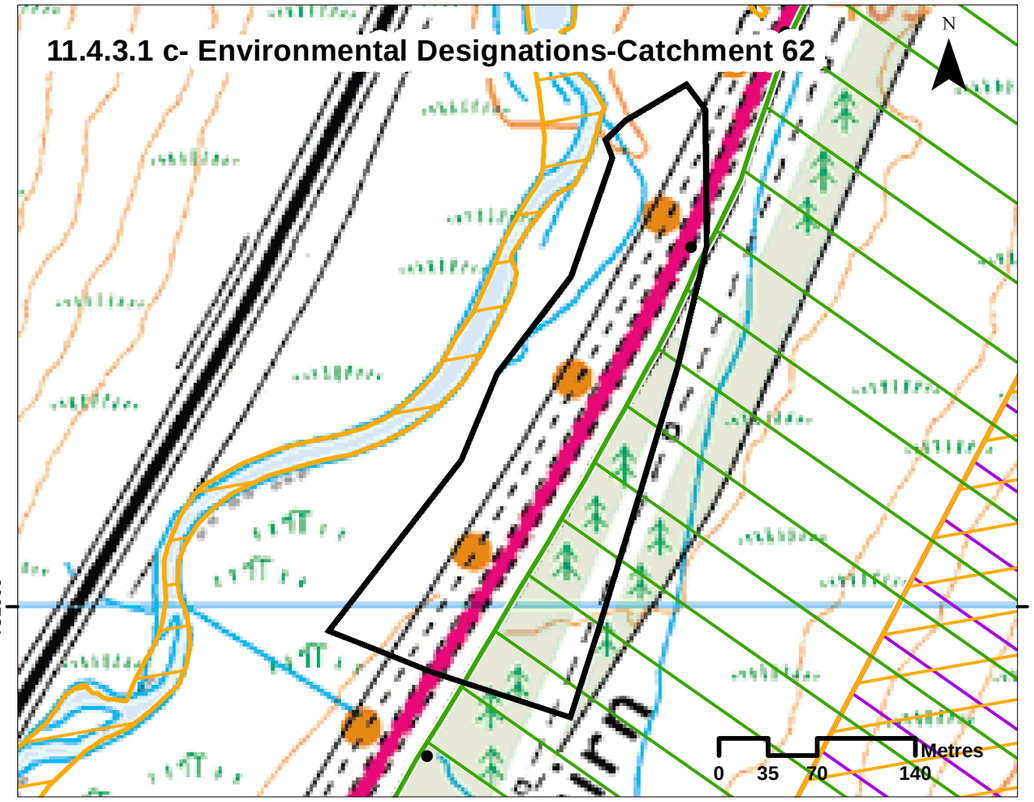
Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	Gravel	
	Estimated discharge at 1:200 event (m^3/s)	N/A	Design flow 0.25 m^3/s
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	None	

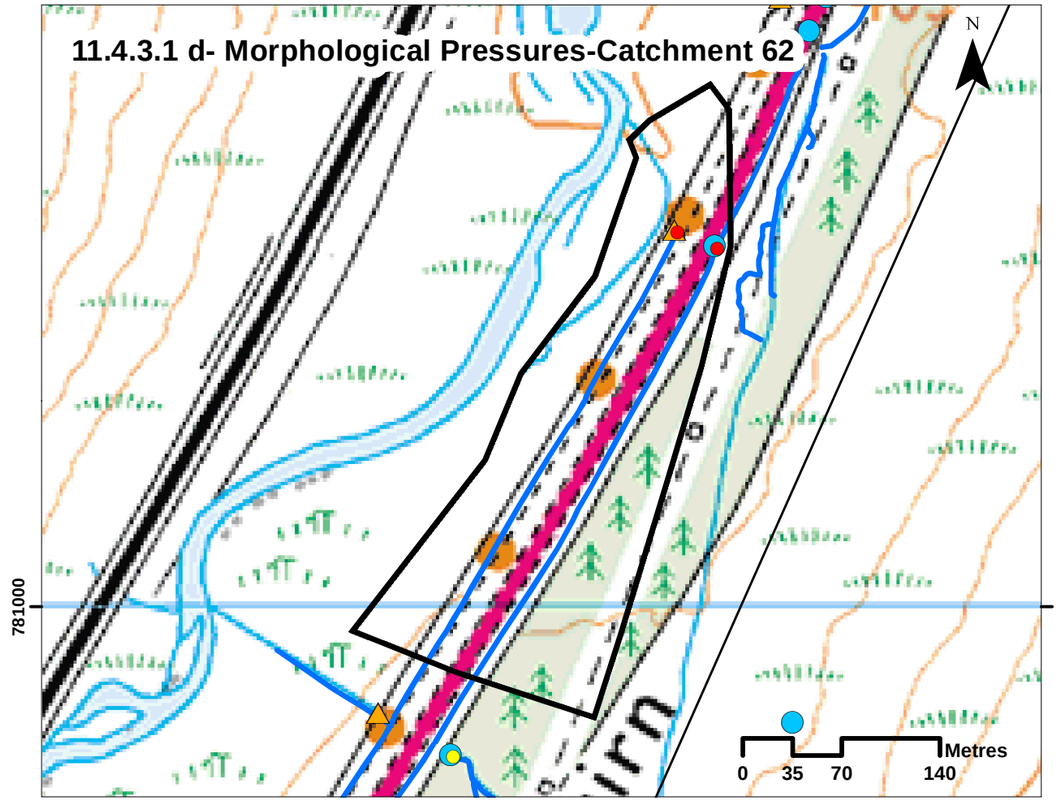
Morphology and Process- Reach downstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Gravel	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	Low	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 62)	None	
	Impact of infrastructure	None	
	Channel realignment	None	

Summary behaviour	No direct sediment supply to channel, yet drain has a seemingly natural bed. Sediment source and channel cannot be identified on OS mapping or aerial imagery. Some of this sediment may have arisen from erosion where the channel bends to become road-parallel but more likely just the alluvial fan material into which the drain is cut.









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Track/Footbridge
- Culvert
- Step in Bed
- Catchpit
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

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

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 62 Catchment Overview

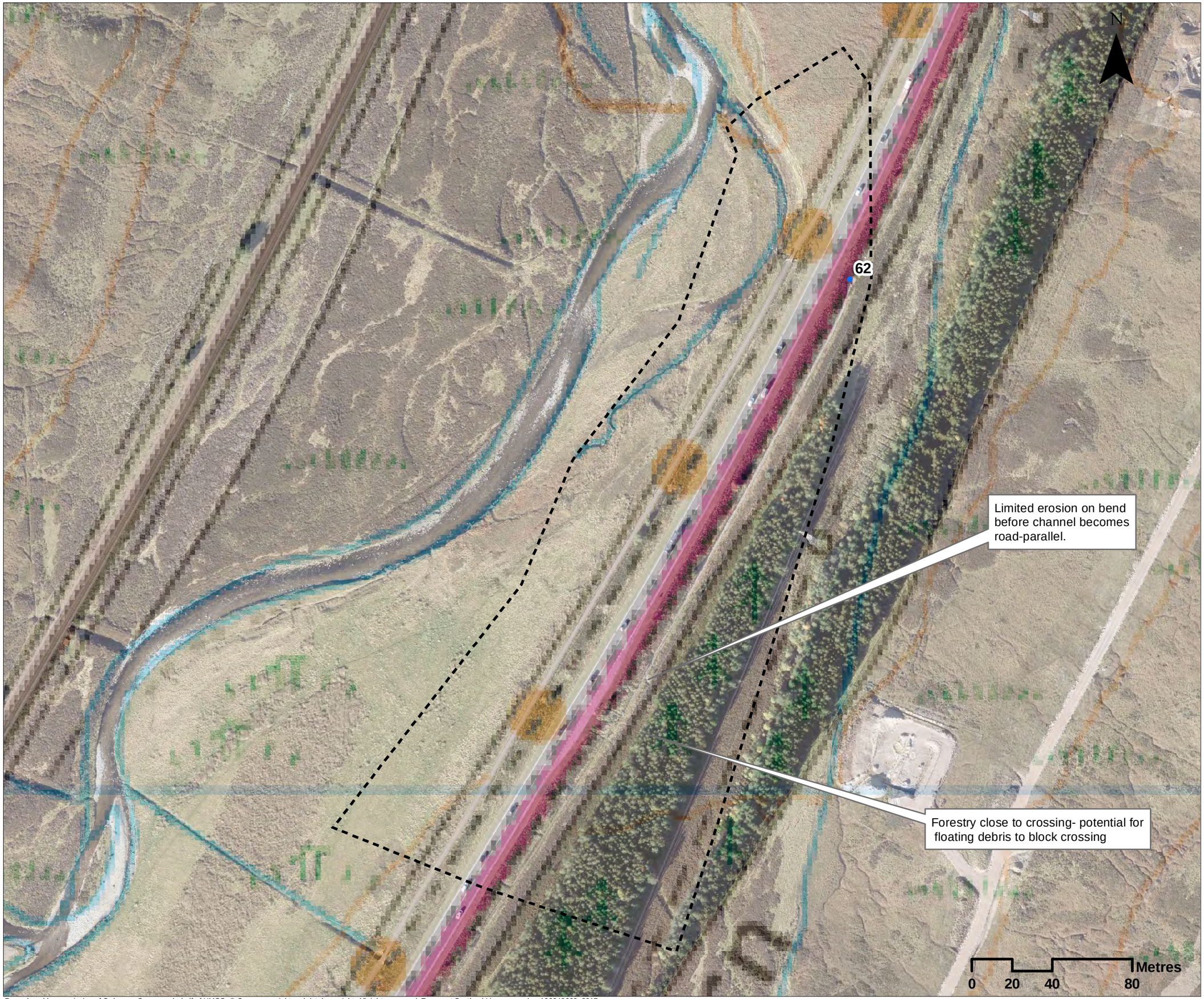
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

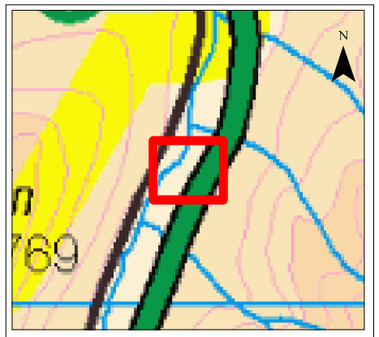
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Other crossing
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m. 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 62 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: I:\BHXP\P07\1Proj\Transportation\TNXU\GIS - TQ Business Development\Small Projects\ArcGIS\Maps\Detailed assessment maps\Assessment 62.mxd

Annex 11.4.3 - Hydromorphological Catchment Assessment - 63

Catchment No.	**63**
Catchment Name	-

Channel Nature	Nature of water course	Natural
	Size of water course	Minor

Quantitative Spatial Elements	Catchment Area (km^2)	0.7
	Average slope in catchment (°)	12
	% Catchment over 750m (for snow melt risk)	0

WFD classification	Water, flows and levels	Good
	Physical condition	Good
	Overall ecological status	Good

Geology	Majority Bedrock (see Drawing 11.4.3.1 a and b Catchment 63)	Gaick Psammite formation-Psammite	Resistant to weathering, impermeable
	Is an alluvial fan present at or near the crossing?	Yes	Near the point where the alluvial fans from Allt Coire a Chùirn and Allt Coire Bhotie coalesce. Due to topography, risk of avulsion from either of these two major channels low.

Environmental designations (see Drawing 11.4.3.1 c, Catchment 63)	Ramsar	No	
	SAC	River Spey Drumochter Hills	Atlantic salmon, freshwater pearl mussel, otter, sea lamprey Acidic scree, alpine and subalpine heaths, blanket bog, dry heaths, monntane acid grasslands , mountain willow scrub, plants in crevices on acid rocks, species-rich grassland with mat-grass in upland areas, tall herb communities, wet heathland with cross-leaved
	SPA	Drumochter Hills	Dotterel breeding, merlin breeding
	SSSI	Drumochter Hills	Breeding bird assemblage, fluvial geomorphology of Scotland, montane assemblage, vascular plant assemblage

Sediment source and supply - Catchment Scale	Changes in slope and channel confinement	See Drawing 11.4.3.2, Catchment 63	
	Is peat present in the catchment?	None	
	Is there a bog burst risk?	None	
	Current valley side or terrace erosion	None	
	Potential valley side or terrace erosion	None	
	Hill slope failures (including peat slides and debris flows and slides)	Yes	
	Hill slope failures coupled to channel	None	
	Vertical incision present in catchment	None	
	Bank erosion/lateral migration	None	
	Unvegetated bars	None	
	Wooded/forested areas in catchment	Yes	Chance of floating debris to crossing
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 63)	None	
	Comment on sediment source potential in catchment	Sediment is available within the catchment but its not coupled with the channel, slowing the speed to sediment delivery to the crossing	
	Comment on sediment supply potential to crossing	Limited source in proximity of channel, channel is not very steep so will move sediment slowly	

Morphology and Process- Reach upstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Cobbles and gravels	
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 63)	None	
	Impact of infrastructure	None	
	Channel realignment	Yes	

Morphology and Process- At crossing	Channel morphology	Engineered	
	Predominant sediment size	None	
	Estimated discharge at 1:200 event (m^3/s)	6.93	This might be from combined 63 and 64 catchments.
	Unvegetated bars	None	
	Vertical incision	None	
	Deposition	None	
	Lateral migration/bank erosion	None	
	Damaged/unstable drains or armouring	Some damage to bed protection at downstream end	

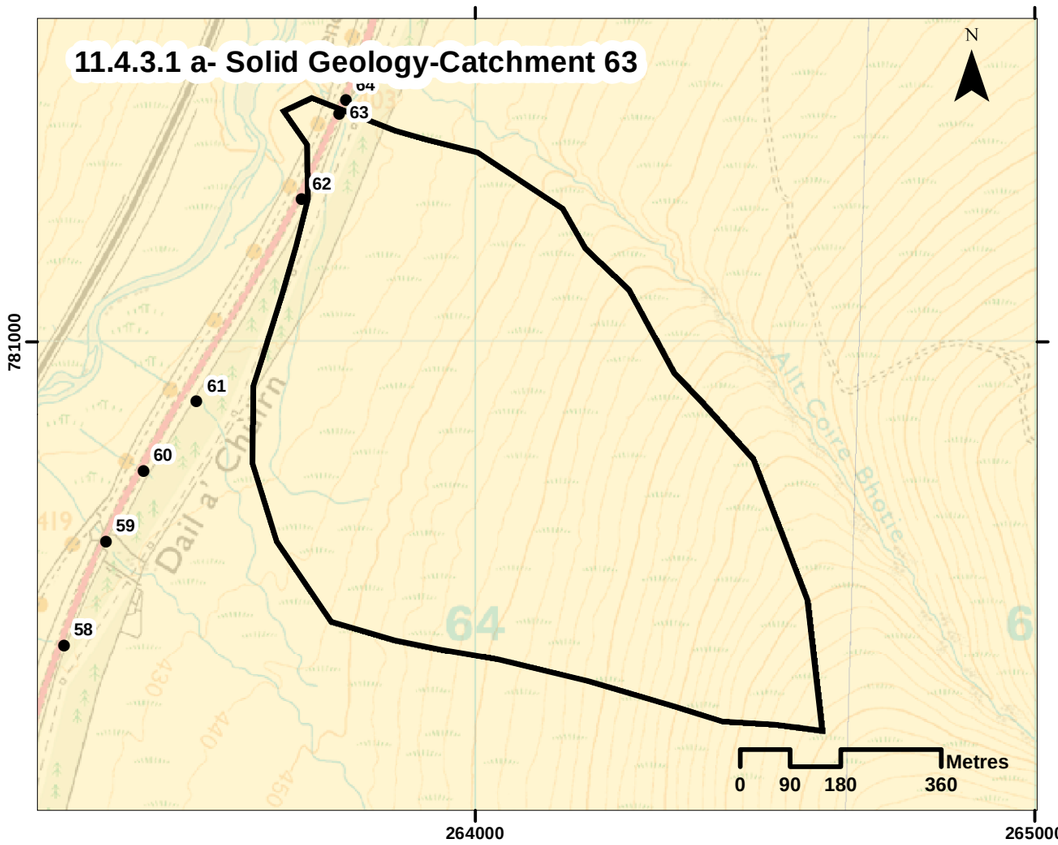
Morphology and Process- Reach downstream of crossing	Channel morphology	Plane bed	
	Predominant sediment size	Cobbles and gravels	
	Unvegetated bars	Yes	
	Vertical incision	High	Downstream of confluence with 64
	Deposition	Medium	Downstream of confluence with 64
	Lateral migration/bank erosion	Low	Downstream of confluence with 64
	Infrastructure type (see Drawing 11.4.3.1 d, Catchment 63)	None	
	Impact of infrastructure	None	
	Channel realignment	None	

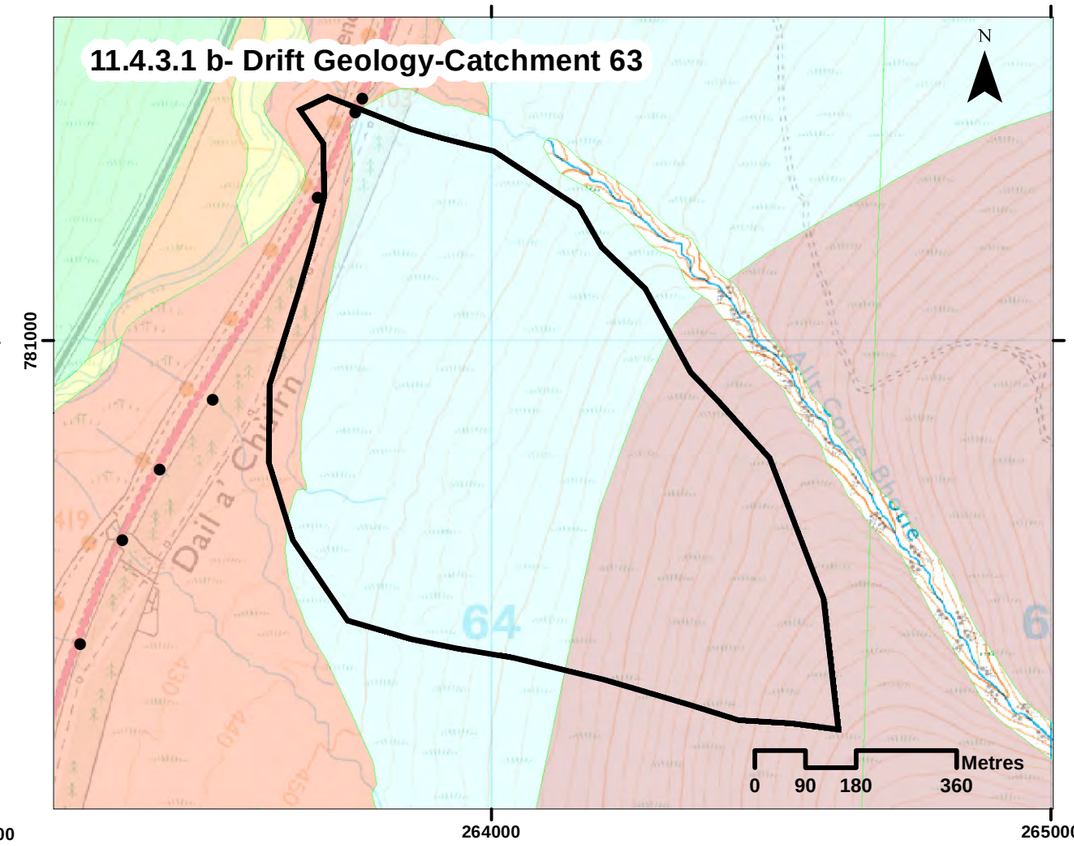
Summary behaviour	Channel has been realigned u/s of the road, but channel length remains similar to original channel and little activity. Issues identified downstream of confluence with crossing 64 channel are attributable to crossing 64.

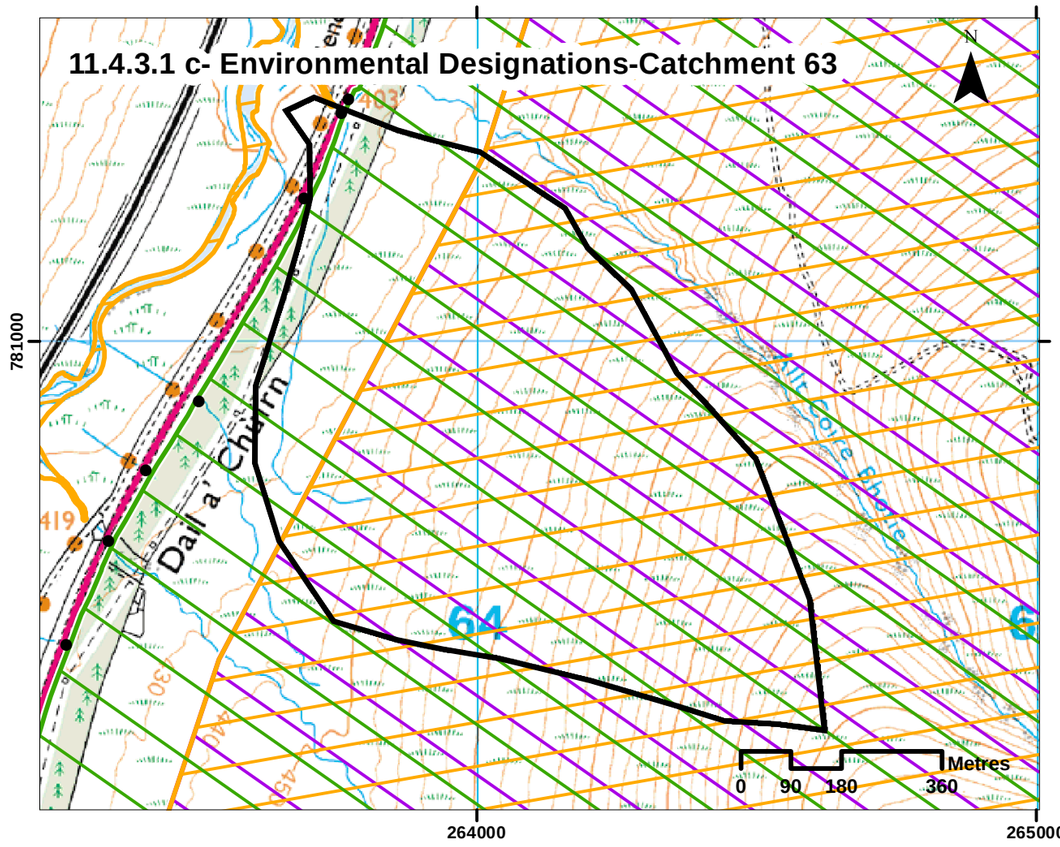
Photograph 11.4.3.94- Upstream to pipe

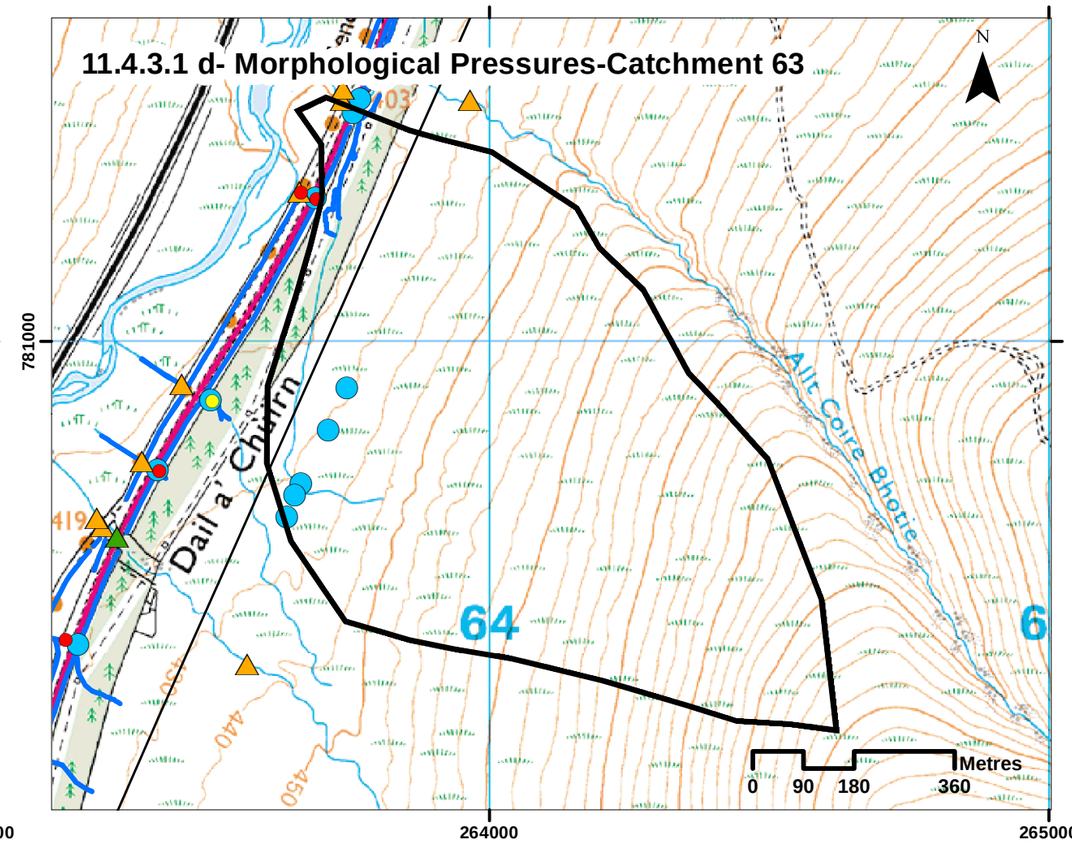
Photograph 11.4.3.95- Downstream to confluence with crossing 64, failing channel banks

Photograph 11.4.3.96- Upstream of crossing, confined channel









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 Site of Scientific Interest
- Special Area of Conservation
- Special Protection Area

Morphological Pressures
- Road Bridge
- Track/Footbridge
- Culvert
- Step in Bed
- Catchpit
- Drainage Ditch
- Power Lines

REV	SUIT	DATE	DESCRIPTION	BY	APP

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

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

Drawing 11.4.3.1 Catchment 63 Catchment Overview

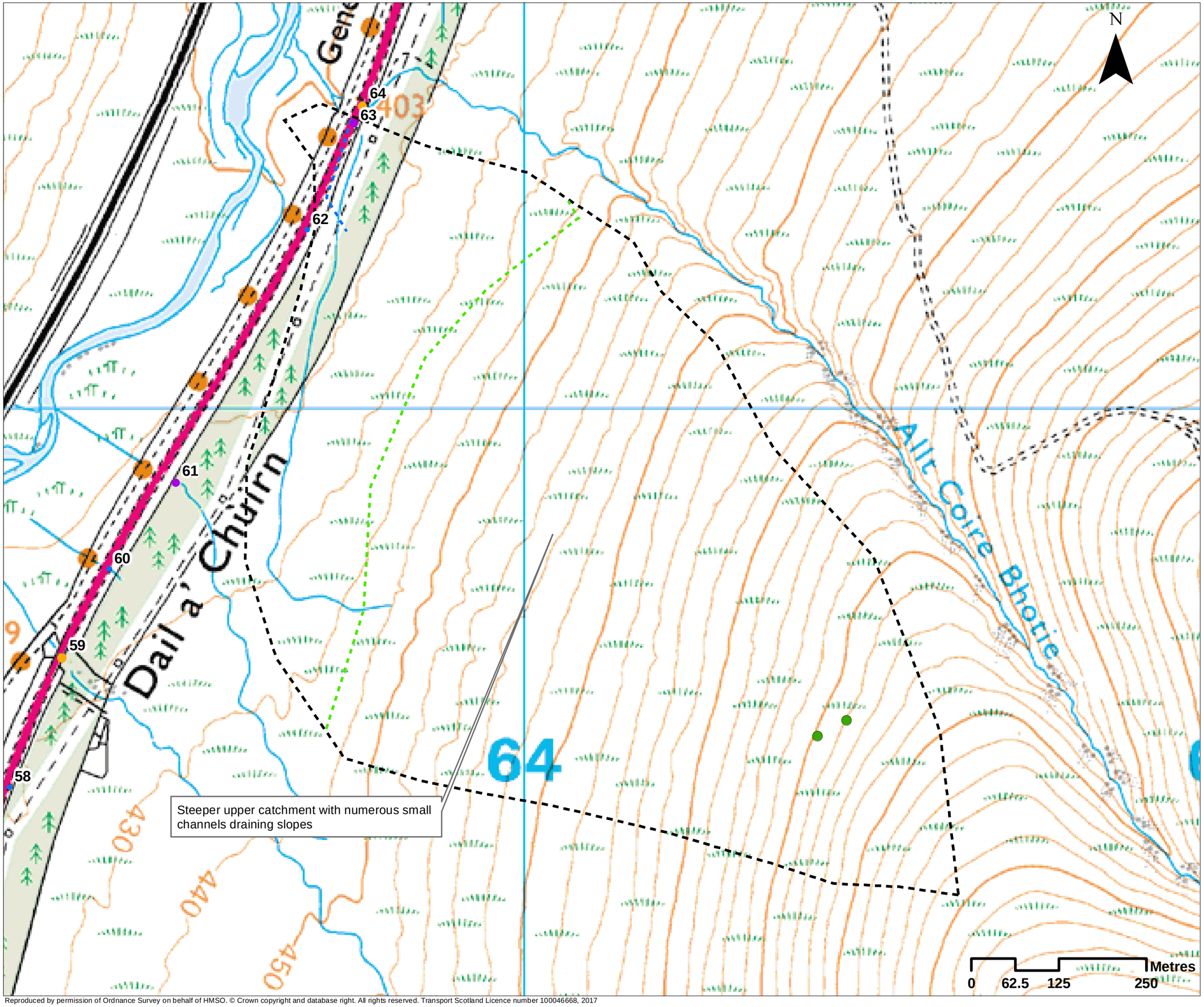
DESIGN:	DRAWN:	CHK:	APP:
EL	EV	EL	EL

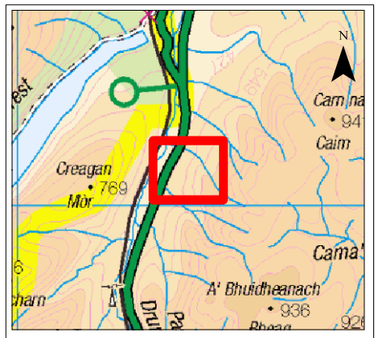
DATE: 18/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0001

SHEET:	REVISION:	SUITABILITY:
1 of 1	C01	S3





Legend

- Major crossing
- Minor crossing
- Other crossing
- Debris flow
- Break in slope
- Original channel
- Crossing catchment

REV	SUIT	DATE	DESCRIPTION	BY	APP

ch2m 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

TRANSPORT SCOTLAND

A9 DUALLING PERTH TO INVERNESS

PROJECT 7 GLEN GARRY TO DALWHINNIE EIA

DRAWING 11.4.3.2. Catchment 63 Baseline Assessment

DESIGN:	DRAWN:	CHK:	APP:
EL	EL	AB	EL

DATE: 10/07/2017

PROJ: 495298

DWG: A9P07-CFJ-EWE-Z_ZZZZZ_ZZ-DR-EN-0002

SHEET:	REVISION:	SUITABILITY:
1 OF 1	C01	A3

Document Path: I:\WKFP\P01\Proj\Transportation\NXUGH - TQ Business Development\Small Projects\EIS\SIMaps\Detailed assessment maps\4assessment 63.mxd