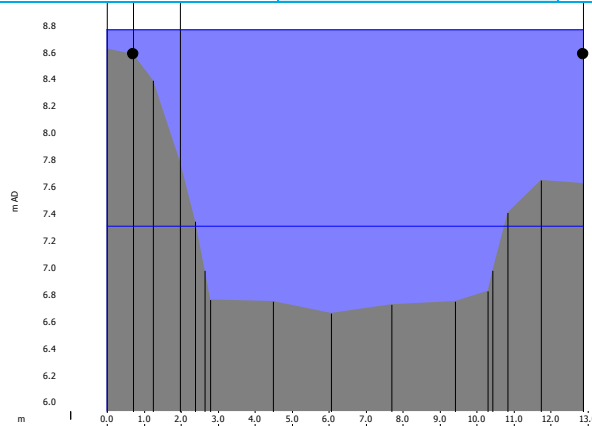


<p>Photograph 5: Section of recently installed earth embankment, raised to prevent local flooding. Looks well vegetated and stable.</p>	
	

Description	Earth embankment, with stone protection at base, and sandbags around garage.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good at top of embankment, although services likely to be present and partial road closure req.
Structural comments	Embankment appeared reasonably intact, although because it has been recently constructed it is not clear how it would perform under flood flows.	
Design considerations	Flood defence wall may be built along side of road on piles to avoid damage to tree roots.	
General condition	Good	
Remedial action required	None	

Reference & Chainage	<b>LS15</b> <b>0.705-0.736</b>	Location	OS NGR 386977,785653
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



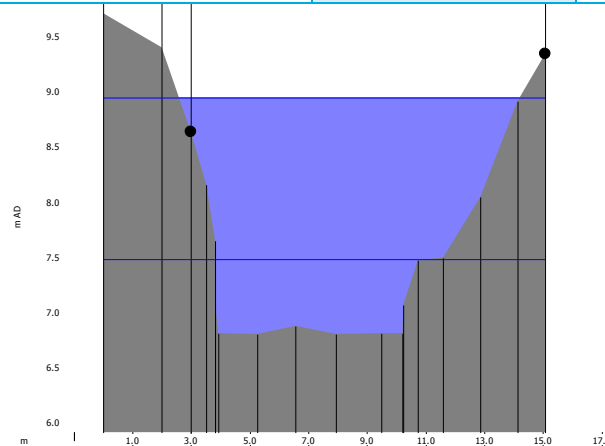
Photograph 1: Gabion wall, showing some signs of bulging, looks relatively recent.



Description	Gabion Wall	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access along bank, limited space for investigation.
Structural comments	Some signs of bulging possibly due to gabions being filled with small rounded or sub angular stone. No signs of settlement.	
Design considerations		
General condition	Good.	
Remedial action required	None	

Reference & Chainage	<b>LS16 0.736-0.760</b>	Location	OS NGR 386945,785654
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of rendered wall showing signs of cracking, and vegetation growth.

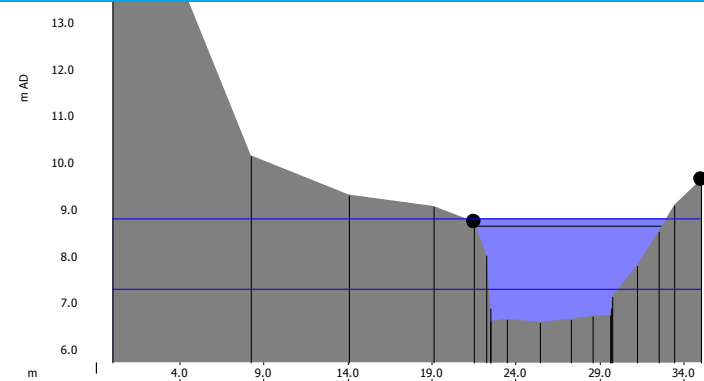


Photograph 2: View of wall up to bridge. Note tree growth.



Description	Drystone wall with partially rendered face.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access along bank, ground sloping, quite steeply. Limited access for vehicles.
Structural comments	Some signs of movement. Appears reasonably stable, although on inside of bend so not subject to high velocities and erosion.	
Design considerations		
General condition	Fair	
Remedial action required	Some consolidation of wall required, using traditional drystone walling techniques.	



Reference & Chainage	<b>B5 0.760</b>	Location	OS NGR 386922,785645
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Bridge
Model cross section showing peak 0.5% AP (200 year) event water level			

Photograph 1: View of bridge

Photograph 2: Elevation of bridge looking downstream



Photograph 3: View showing duct detached from support brackets, and detached corrugated steel decking



Photograph 4: View showing corrosion of steelwork



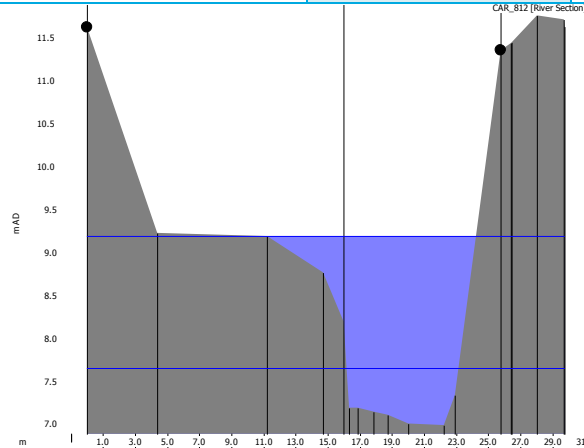


Photograph 5: View below deck towards RHB	
	

Description	Steel truss bridge supporting concrete deck. Abutments not visible likely mass concrete or stonework.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	
Structural comments	Steel extensively corroded. Steel nuts and bolts showing signs of severe corrosion.	
Design considerations	The bridge may be acting as choke point. It should be possible to free the ends and jack it up. Abutments may need rebuilding.	
General condition	Fair	
Remedial action required	Loose sheeting and ducts to be removed. Bridge requires repainting, and ideally a new deck.	

Reference & Chainage	<b>RS9 0.787-0.815</b>	Location	OS NGR 386902,785628
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: Downstream end of wall, showing area of loose stonework.



Photograph 2: Middle and upstream end of wall, showing area of loose stonework.

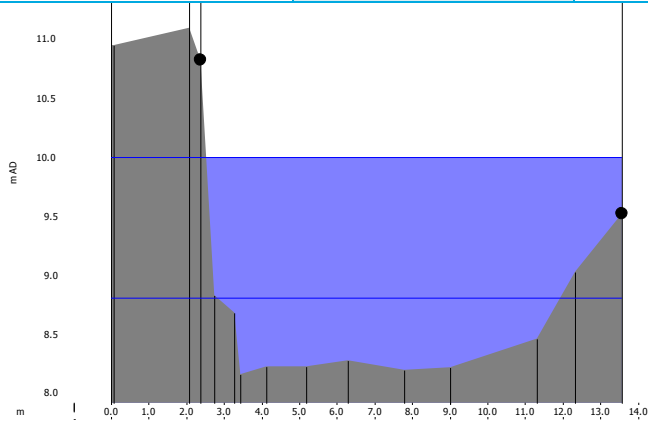


Description	Drystone retaining wall, reinforced with concrete wall	
Anticipated Ground Conditions	Fill over Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good, although services likely to be present and partial road closure required.
Structural comments	Some loose stonework in drystone wall, otherwise wall looks stable and intact.	
Design considerations		
General condition	Fair	
Remedial action required	Some consolidation of wall required, using traditional drystone walling techniques.	



Reference & Chainage	<b>LS17</b> <b>0.760-1.081</b>	Location	OS NGR 386916,785649
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View along wall looking downstream, towards bridge.



Photograph 2: Close up showing tree growth and loose stones.



Photograph 3: View of wall on inside of bend some evidence of erosion at base.



Photograph 4: View upstream showing bank opposite, bank eroding on outside of bend.





Photograph 5: Drystone wall at start of bend.



Photograph 6: Drystone wall at start of bend (cont.).



Photograph 7: Drystone wall, note concrete cill.



Photograph 8: Tree growth from wall.



Photograph 9: View along drystone wall.



Photograph 10: Close up. Base of wall has been pointed in places with cement based pointing, note loose stones.



Photograph 11: Tree growth from base of wall (tree has been ring barked).

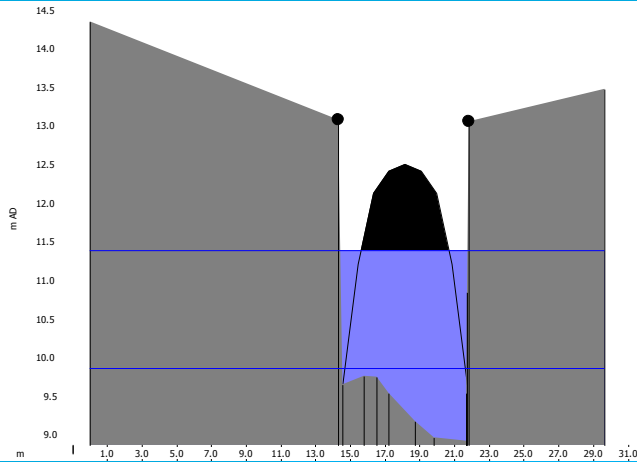


Description	Drystone wall, with concrete cill added at base to prevent corrosion	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access through private land/gardens, although many areas difficult some areas have reasonably good access.
Structural comments	Although wall has large areas with loose stones, and some areas are showing signs of bulging, this is mainly due to vegetation growth. The majority of the wall is intact and no areas have collapsed. It is unclear how deep the concrete sill extends.	
Design considerations		
General condition	Fair, although this could deteriorate quickly to poor if no remedial action undertaken.	
Remedial action required	Wall may be consolidated and rebuilt in areas using traditional drystone walling techniques.	



Reference & Chainage	<b>B6 1.081-1.099</b>	Location	OS NGR 386700,785539
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Bridge

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of concrete arch culvert looking upstream showing RHB.

Photograph 2: View of concrete arch culvert looking upstream showing LHB.



Photograph 3: View of concrete arch culvert looking downstream.

Photograph 4: View behind wing wall, showing possible erosion.

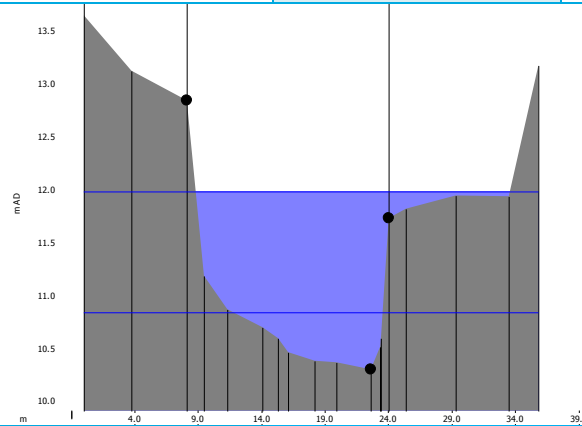




Description	Concrete Arch bridge, with corrugated steel lining	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good, although services likely to be present and partial road closure required.
Structural comments	No obvious sign of movement, some evidence of minor erosion behind upstream RHB wing wall.	
Design considerations		
General condition	Good	
Remedial action required	None required.	

Reference & Chainage	<b>LS18 1.099-1.222</b>	Location	OS NGR 386687,785500
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Bank

Model cross section showing peak 0.5% AP (200 year) event water level



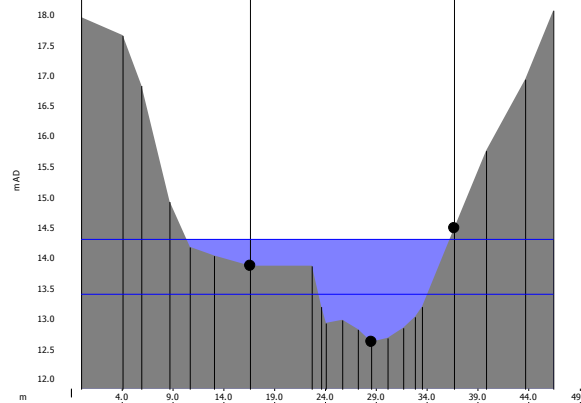
Photograph 1: View showing bank erosion



Description	Natural Earth Bank	
Anticipated Ground Conditions	Silt, Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good
Structural comments	Continual erosion of river bank.	
Design considerations	No properties affected.	
General condition	N/A	
Remedial action required	None required if rate of erosion acceptable.	

Reference & Chainage	<b>RS10 1.443-1.463</b>	Location	OS NGR 386532,785259
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of gabion wall, which is well vegetated.

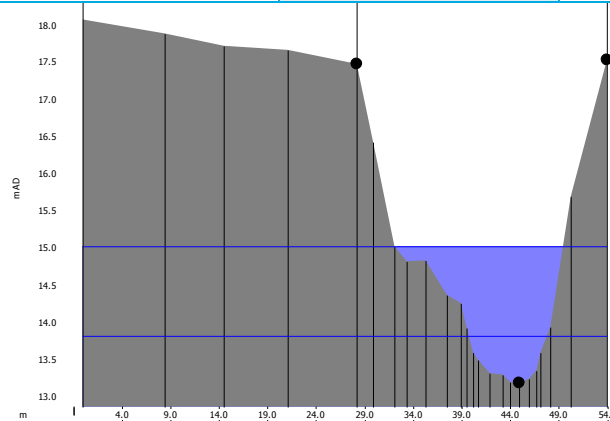


Description	Gabion wall placed to prevent landslip extending.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Steep slope, difficult access
Structural comments	Gabion wall looks stable, and well vegetated.	
Design considerations		
General condition	Good	
Remedial action required	None at present	



Reference & Chainage	<b>RS11 1.493-1.513</b>	Location	OS NGR 386490,785229
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



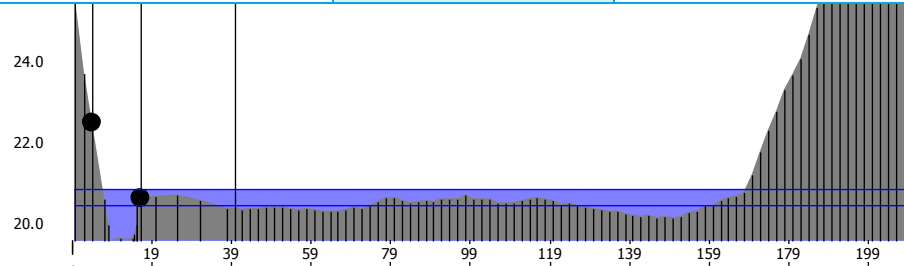
Photograph 1: View of gabion wall, looks like there is a void behind the wall.



Description	Gabion wall placed to prevent landslip extending.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access through walled garden, possibly accessible for terrier rig.
Structural comments	Wall shows signs of settlement on downstream end. A void is also visible behind the wall at this end. This is likely to be due to erosion of the soil behind and below the gabions at this end.	
Design considerations		
General condition	Fair	
Remedial action required	Erosion protection required, at base of Gabion wall.	

Reference & Chainage	<b>LS19</b> <b>1.919-2.045</b>	Location	OS NGR 386186,785397
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Bank

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of steep bank on outside of bank showing extensive signs of instability.



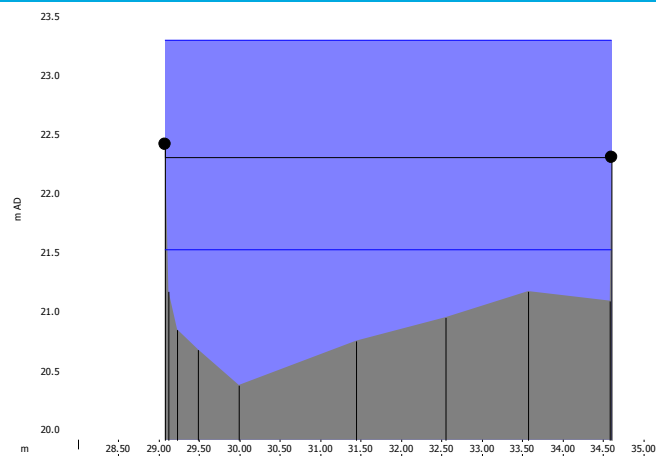
Photograph 2: View of steep bank on outside of bank (cont.).



Description	Earth Bank	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access through private land/gardens likely to be good in places.
Structural comments	Bank shows widespread evidence of instability primarily due to erosion at toe. If left erosion might eventually endanger properties at top of embankment.	
Design considerations		
General condition	Slope natural and unreinforced. Condition acceptable if rate of erosion acceptable.	
Remedial action required	None at present.	

Reference & Chainage	<b>B7 2.141</b>	Location	OS NGR 386076,785405
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Bridge

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of bridge looking upstream.

Photograph 2: View of LHB abutment, note cracking and erosion of steel beams.

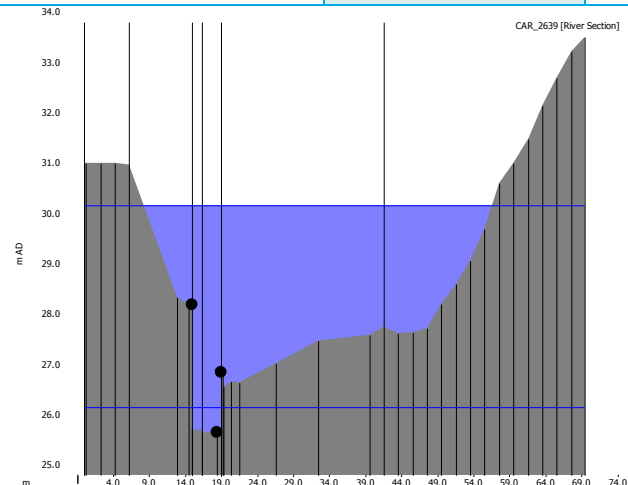


Photograph 3: RHB abutment.



Description	Private access bridge, consisting steel joists supporting timber sleepers, on stone or mass concrete abutments.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good, although bridge unlikely to be able to support heavy plant
Structural comments	Bridge poorly constructed for lightweight vehicles only. LHB abutment showing some signs of movement. Unlikely to withstand high flood flows.	
Design considerations	As the state of the existing bridge is poor, it is likely to need replacing. This may be at a higher level than existing, if it is required to increase channel capacity.	
General condition	Poor	
Remedial action required	A replacement bridge including abutments probably required, in near to medium term.	



Reference & Chainage	<b>B8</b> <b>2.555-2.640</b>	Location	OS NGR 385653,785536
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Culvert
Model cross section showing peak 0.5% AP (200 year) event water level			

Photograph 1: Exit to culvert.



Photograph 3: Gabion Wall on RHB below exit to culvert, wall looks uneven. Note placement of stones in front of wall.



Photograph 2: Gabion Wall on RHB below exit to culvert, note placement of stones in front of gabions.



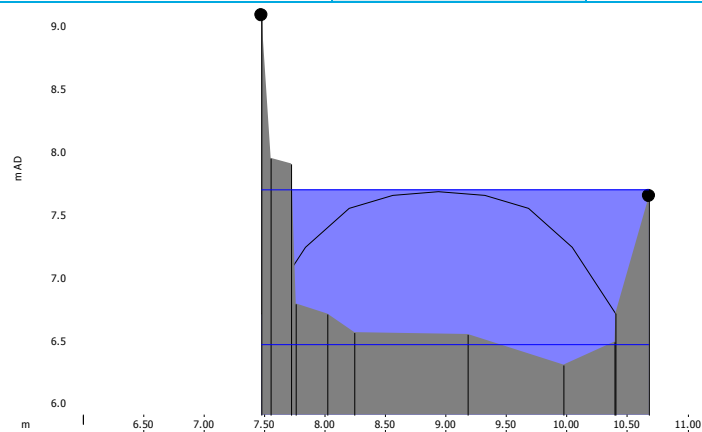
Photograph 4: View of entrance to culvert.



Description	Reinforced concrete 'box' culvert with fish ladder.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access, likely to be difficult, although records should exist for construction of culvert.
Structural comments	Level of flood debris would indicate that culvert has been running full. Condition of culvert itself is good, although velocity of water is high at exit leading to erosion of river bed below gabions. Some rock armouring has been placed to prevent this.	
Design considerations		
General condition	Good	
Remedial action required	None, although this should be reviewed at regular intervals.	

Reference & Chainage	<b>B9</b>	Location	OS NGR 387083,785617
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Culvert

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of exit to culvert.

Photograph 1: View of showing entrance to culvert.

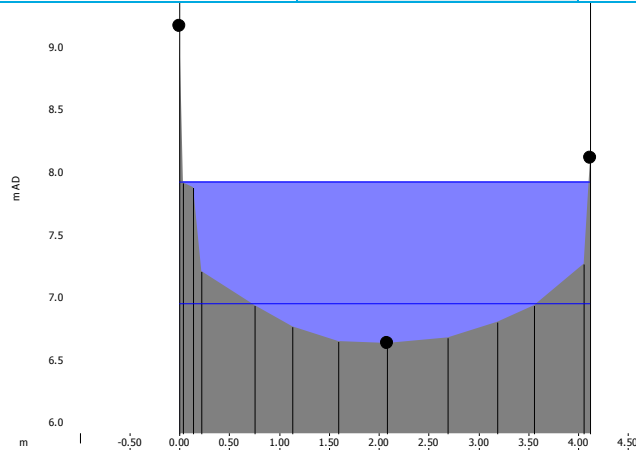


Description	Concrete arched culvert, with reinforced concrete spandrel wall on exit.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good
Structural comments	No obvious signs of movement in abutments or arch.	
Design considerations		
General condition	Good	
Remedial action required	None	



Reference & Chainage	<b>LS20</b>	Location	OS NGR 387080,785611
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of wall.



Photograph 2: View of wall.



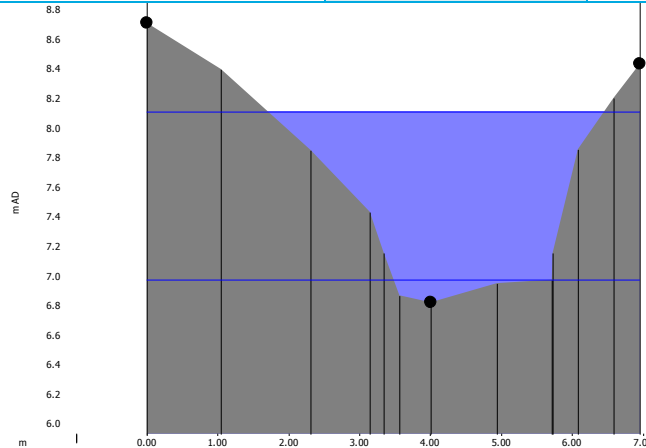
Photograph 3: View of wall.



Description	Stone wall on concrete base.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good
Structural comments	No obvious signs of movement. It is unclear how far the footings extend. Some growth of vegetation.	
Design considerations		
General condition	Good	
Remedial action required	None	

Reference & Chainage	<b>B10</b>	Location	OS NGR 387076,785579
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Culvert

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: Entrance to culvert.

Photograph 2: Exit to culvert.

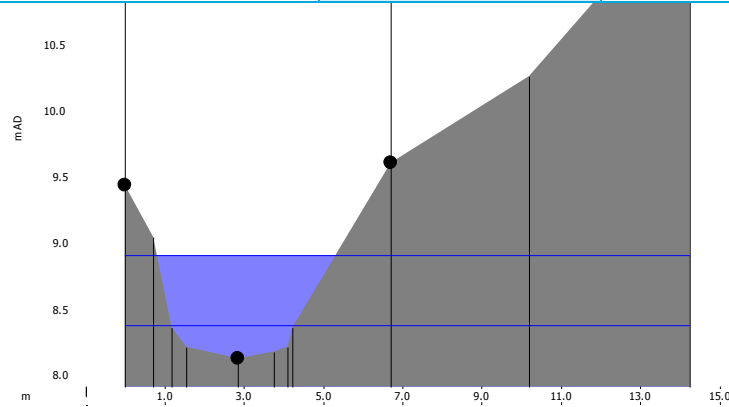


Description	Concrete arch culvert with stonework spandrel walls.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good
Structural comments	No obvious signs of movement	
Design considerations		
General condition	Good	
Remedial action required	None	



Reference & Chainage	<b>LS21</b>	Location	OS NGR 387070,785563
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Bank

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of wall.



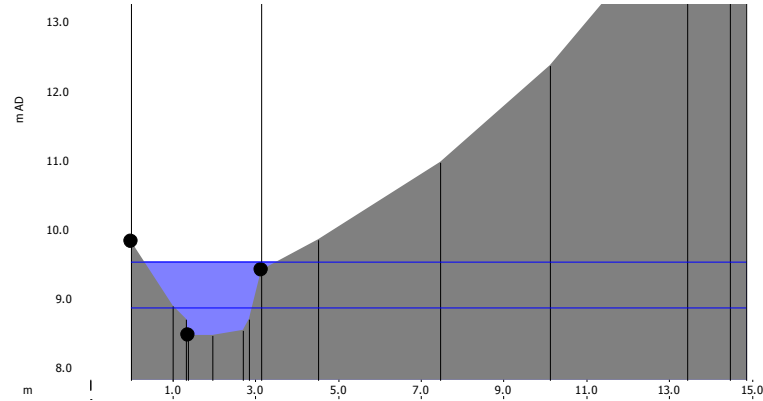
Photograph 2: View of bank.



Description	Bank alongside access road.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Good
Structural comments	Bank showing signs of rapid erosion, could endanger adjacent access road.	
Design considerations		
General condition	Slope natural and unreinforced. Condition only unacceptable if rate of erosion threatens economic loss.	
Remedial action required	Bank may be reinforced to slow erosion.	

Reference & Chainage	<b>LS22</b>	Location	OS NGR 387029,785493
Date of Inspection	7 April 2010	Inspector(s)	Stephen Farrar
Nature of Inspection	Visual	Nature of Assets	Wall

Model cross section showing peak 0.5% AP (200 year) event water level



Photograph 1: View of wall, note general poor quality of construction.



Photograph 2: Note undermining at base



Photograph 3: Note vegetation at base and general poor quality.

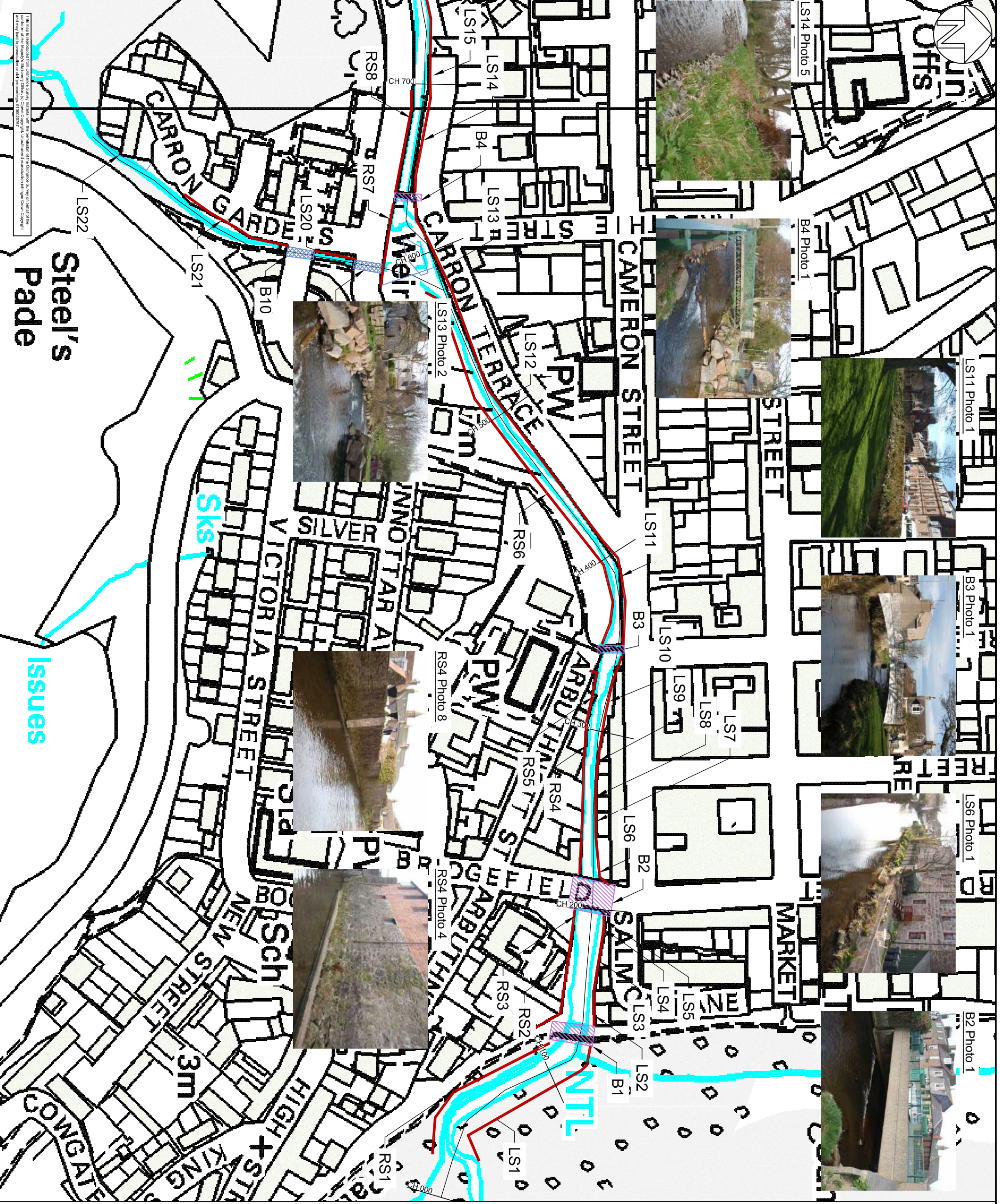


Description	Blockwork boundary wall built on mass concrete footings.	
Anticipated Ground Conditions	Sand & Gravels.	
Potential Ground Investigation	Type	In situ SPT's, Soil grading
	Access	Access behind wall through private garden. Likely to be restricted.
Structural comments	Wall poorly constructed, evidence that base is being eroded, although no evidence of major structural movement.	
Design considerations	The wall is unlikely to be able to provide a high level of flood protection. It is liable to collapse or partial collapse if footings undermined.	
General condition	Fair	
Remedial action required	None at present.	



## C.8 Plans of structure locations





**General Notes**

- All dimensions shown are in metres unless otherwise stated and levels in metres to Ordnance Datum.
- Do not scale from this drawing. All dimensions must be checked/verified on site - if in doubt ask.
- This drawing is to be read in conjunction with all relevant Architect, Engineers and Specialist drawings and Specifications.
- Any discrepancies noted on site are to be reported to the Engineer immediately.
- Background Information supplied by JBA Consulting 6 April 2011.
- Structure Inspection undertaken by JBA Consulting 6 April 2011.
- Location of structures is indicative and should be confirmed with detailed survey prior to the commencement of works.
- Drawing to be read in conjunction with:-  
2011/14980-SK02 - Structures Location Plan CH 700 - CH 1800  
2011/14980-SK03 - Structures Location Plan CH 1800 - CH 2500  
2011/14980-SK04 - Structures Location Plan CH 2500 - CH 3300

**Legend**

B1	Bridge or Culvert
B2	Left Hand Bank Structure
LS1	Right Hand Bank Structure
RS1	Retaining Wall
	Culvert
	Bridge

Rev.	Modifications	Date	Drawn	Designed	Checked	Approved

**JBA CONSULTING**

Part Head Office  
1 Longfield Road  
Edinburgh  
EH10 9TD  
United Kingdom  
www.jbaconsulting.co.uk  
t +44 (0)131 3192840  
e info@jbaconsulting.co.uk

Officers at Glasgow, Aberdeen, Newcastle upon Tyne, Edinburgh, Warrington, Manchester, Doncaster, Walsgrave, Solihull, Reynolds Heath, Newport, Telford

for \_\_\_\_\_

**Aberdeenshire Council**  
Stonhaven River Carron Flood Alleviation Studies  
Structures Inspection  
Location Plan - CH 000 - CH 700

This document is the property of Aberdeen River Catchment Ltd. It shall not be reproduced in whole or in part, nor adapted in any form, without the prior permission of Aberdeen River Catchment Ltd.

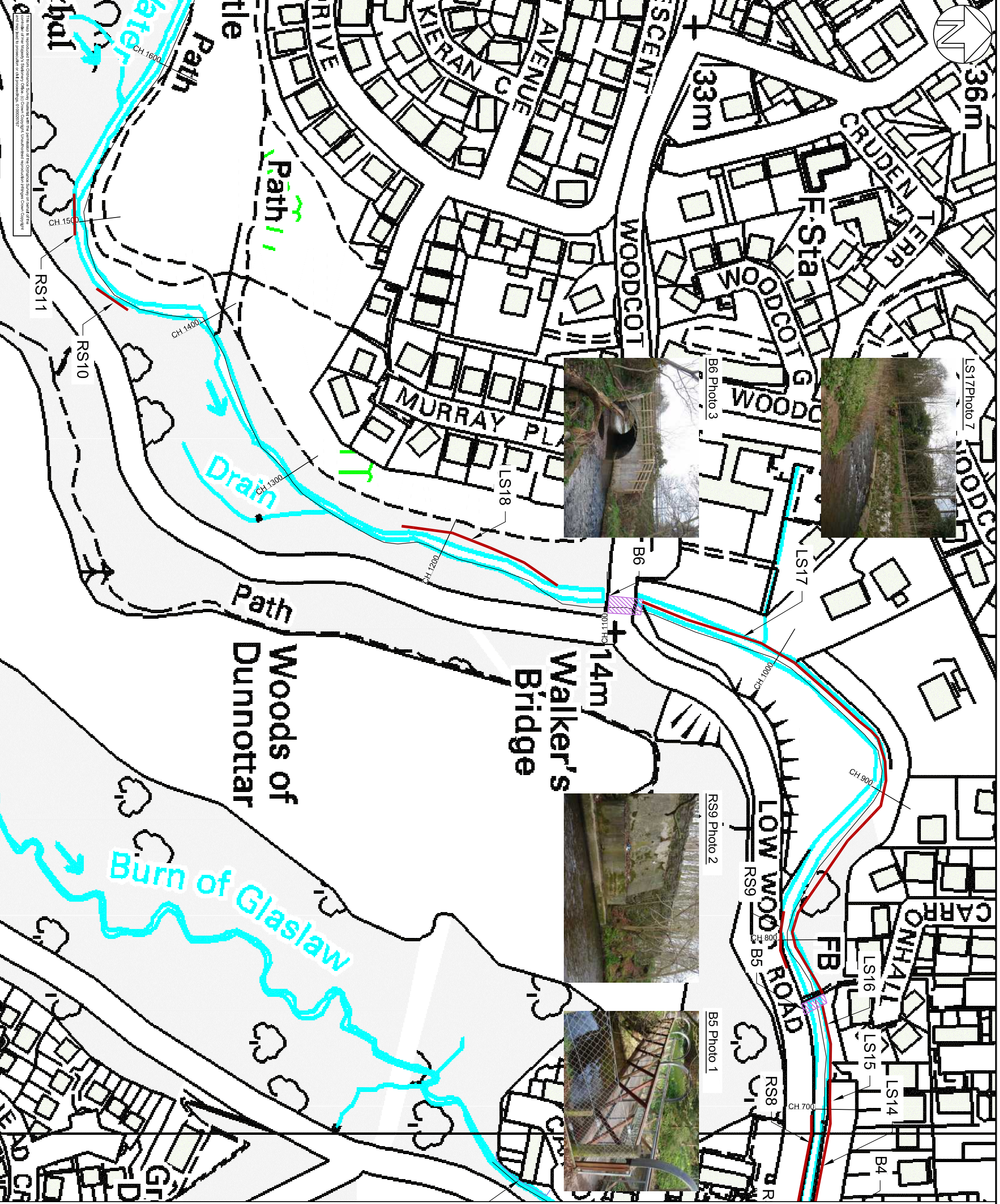
Scale: **1:1000 @ A1**

Drawn:	K Morris	12/05/2011
Designed:	K Morris	12/05/2011
Checked:	S Farrar	13/05/2011
Approved:	S Farrar	13/05/2011

Digital File Name: 2011/14980-SK01-Structures Inspection Location Plan Sheet 1.dwg  
Drawing Number: 2011/14980-SK01  
Rev.:  
Sheet No.: 1 of 4  
Status: Draft

This map is reproduced from Ordnance Survey materials under the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. All Copyright. Unauthorised reproduction infringes Crown Copyright and may be subject to prosecution under the provisions of the Copyright, Designs and Patents Act 1988.





**General Notes**

1. All dimensions shown are in metres unless otherwise stated and levels in metres to Ordnance Datum.
2. Do not scale from this drawing. All dimensions must be checked/verified on site - if in doubt ask.
3. This drawing is to be read in conjunction with all relevant Architect, Engineer and Specialist drawings and Specifications.
4. Any discrepancies noted on site are to be reported to the Engineer immediately.
5. Background Information supplied by Aberdeenshire Council.
6. Structure Inspection undertaken by JBA Consulting 6 April 2011.
7. Location of structures is indicative and should be confirmed with detailed survey prior to the commencement of works.
8. Drawing to be read in conjunction with:
  - 2011184980-SK01 - Structures Location Plan CH 1000 - CH 1700
  - 2011184980-SK02 - Structures Location Plan CH 1600 - CH 2300
  - 2011184980-SK03 - Structures Location Plan CH 1800 - CH 2300
  - 2011184980-SK04 - Structures Location Plan CH 2500 - CH 3300

**Legend**

	Bridge or Culvert
	Left Hand Bank Structure
	Right Hand Bank Structure
	Retaining Wall
	Culvert
	Bridge

Rev.	Modifications	Date	Drawn	Designed	Checked	Approved

**JBA consulting**

Part Walk  
1 Longfild Road  
Eatonburch  
EH10 9TD  
United Kingdom  
www.jbaconsulting.co.uk  
t +44 (0)131 3192940  
e info@jbaconsulting.co.uk

**Aberdeenshire Council**  
Stonhaven River Carron Flood Alleviation Studies  
Structures Inspection  
Location Plan - CH 700 - CH 1600

This document is the property of JBA Consulting Ltd. It shall not be reproduced in whole or in part, nor published in any form, without the permission of JBA Consulting Ltd.

Scale: 1:1000 @ A1

Drawn:	K Morris	12/05/2011
Checked:	S Farrar	13/05/2011
Approved:	S Farrar	13/05/2011

Digital File Name: 2011184980-SK02-Structures Inspection Location Plan Sheet 1.dwg  
Drawing Number: 2011184980-SK02  
Rev.: 2 of 4  
Status: Draft

This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of the Majesty's Stationery Office. All Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. 100000000





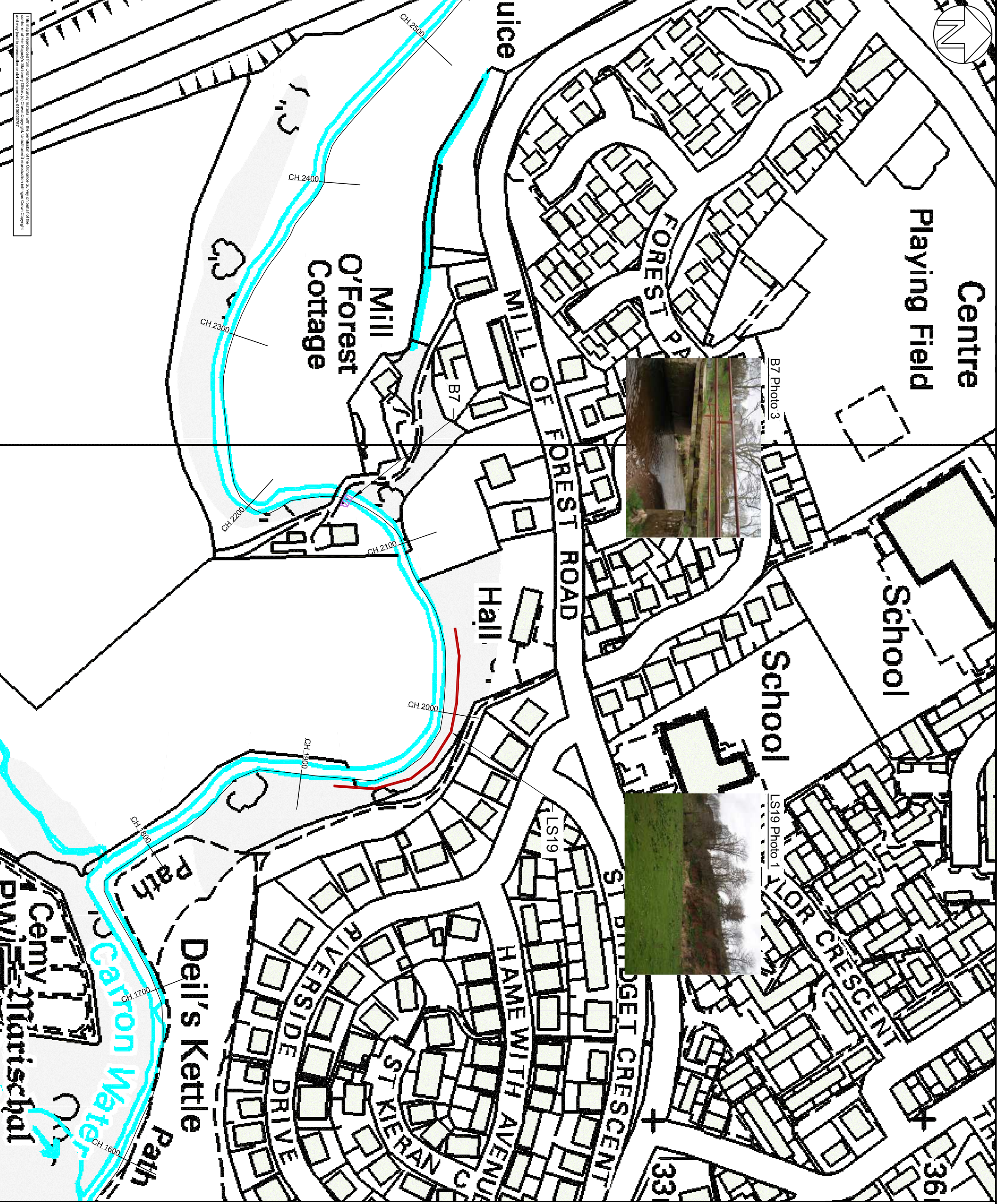
Centre  
Playing Field



B7 Photo 3



LS19 Photo 1



**General Notes**

- All dimensions shown are in metres unless otherwise stated and levels in metres to Ordnance Datum.
- Do not take from this drawing. All dimensions must be checked/verified on site - if in doubt ask.
- This drawing is to be read in conjunction with all relevant Architect, Engineer and Specialist drawings and Specifications.
- Any discrepancies noted on site are to be reported to the Engineer immediately.
- Background Information supplied by Aberdeenshire Council.
- Structure Inspection undertaken by JBA Consulting 6 April 2011.
- Location of structures is indicative and should be confirmed with detailed survey prior to the commencement of works.
- Drawing to be read in conjunction with:-  
2011S4980-SK01 - Structures Location Plan CH 1000 - CH 700  
2011S4980-SK02 - Structures Location Plan CH 700 - CH 1600  
2011S4980-SK03 - Structures Location Plan CH 2500 - CH 3300

**Legend**

	Bridge or Culvert
	Left Hand Bank Structure
	Right Hand Bank Structure
	Retaining Wall
	Culvert
	Bridge

Rev.	Modifications	Date	Drawn	Designed	Checked	Approved

**JBA CONSULTING**

Part Walk  
1 Longfield Road  
Edinburgh  
EH10 9TD  
United Kingdom  
www.jbaconsulting.co.uk  
t +44 (0)131 3192940  
e info@jbaconsulting.co.uk

**Aberdeenshire Council**  
Stonhaven River Carron Flood Alleviation Studies  
Structures Inspection  
Location Plan - CH 1600 - CH 2500

This document is the property of JBA Consulting Ltd. It shall not be reproduced in whole or in part, nor adapted in any way, without the permission of JBA Consulting Ltd.

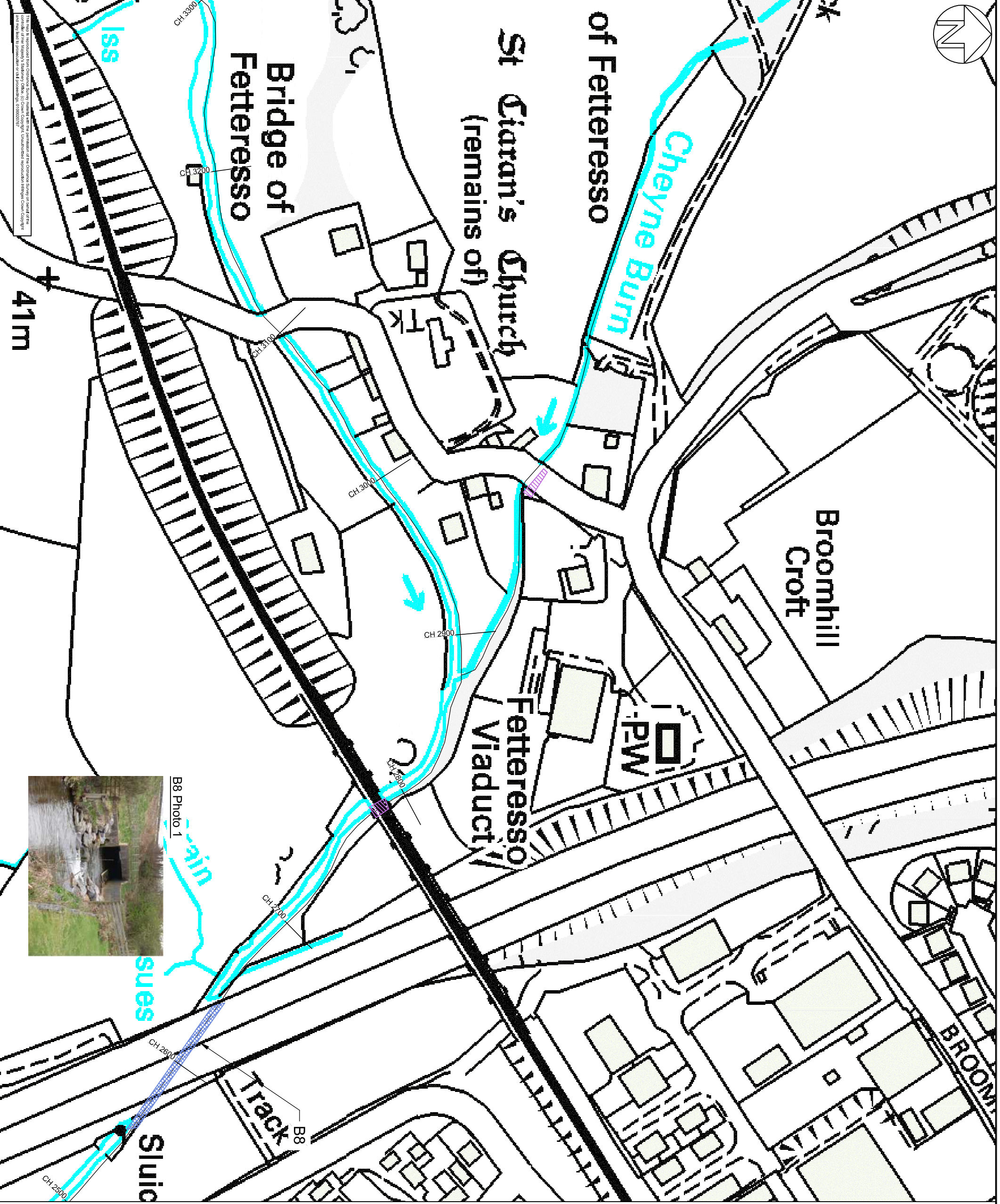
Scale: 1:1000 @ A1

Drawn:	K Morris	12/05/2011
Designed:	K Morris	12/05/2011
Checked:	S Farrar	13/05/2011
Approved:	S Farrar	13/05/2011

Digital File Name: 2011S4980-SK03-Structures Inspection Location Plan Sheet 3.dwg  
Drawing Number: 2011S4980-SK03  
Rev.:  
Sheet No.: 3 of 4  
Status: Draft

This map was produced from Ordnance Survey data with the permission of the Ordnance Survey on behalf of the Controller of the Ordnance Survey. All Rights Reserved. Ordnance Survey is a registered trademark of the Ordnance Survey. All other trademarks are the property of their respective owners.





- General Notes**
- All dimensions shown are in metres unless otherwise stated and levels in metres to datum sea level.
  - Do not use from this drawing. All dimensions must be checked/verified on site - if in doubt ask.
  - This drawing is to be read in conjunction with all relevant Architect, Engineer and Specialist drawings and Specifications.
  - Any discrepancies noted on site are to be reported to the Engineer immediately.
  - Background information supplied by Aberdeenshire Council.
  - Structure Inspection undertaken by JBA Consulting 6 April 2011.
  - Location of structures is indicative and should be confirmed with detailed survey prior to the commencement of works.
  - Drawing to be read in conjunction with:
    - 2011S4980-SK01 - Structures Location Plan CH 000 - CH 700
    - 2011S4980-SK02 - Structures Location Plan CH 700 - CH 1800
    - 2011S4980-SK03 - Structures Location Plan CH 1800 - CH 2500

**Legend**

B1	Bridge or Culvert
LS1	Left Hand Bank Structure
RS1	Right Hand Bank Structure
[Red Box]	Retaining Wall
[Blue Hatched Box]	Culvert
[Purple Hatched Box]	Bridge

Rev.	Modifications	Date	Drawn	Designed	Checked	Approved

**JBA consulting**

Part Hawk  
1 Longridge Road  
EDINBURGH  
EH10 9TD  
United Kingdom  
www.jbaconsulting.co.uk  
t +44 (0)131 3192940  
f +44 (0)131 3192944  
e info@jbaconsulting.co.uk

Officers at Stonehaven, Newcastle upon Tyne, Edinburgh, Warrington, Manchester, Doncaster, Walsbyrig, Salford, Heywood, High Wycombe, Telford

for \_\_\_\_\_

**Aberdeenshire Council**  
Stonehaven River Carron Flood Alleviation Studies  
Structures Inspection  
Location Plan - CH 2500 - CH 3300

This document is the property of JBA Consulting Ltd. It shall not be reproduced in whole or in part, nor allowed to be used in any way, without the permission of JBA Consulting Ltd.

Scale: 1:1000 @ A1

Drawn:	K Morris	12/05/2011
Designed:	K Morris	12/05/2011
Checked:	S Farrar	13/05/2011
Approved:	S Farrar	13/05/2011

Digital File Name: 2011S4980-SK04-Structures Inspection Location Plan Sheet 4.dwg  
Drawing Number: 2011S4980-SK04  
Rev.: 4 of 4  
Sheet No.:  
Status: Draft

This plan is reproduced from Ordnance Survey maps with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. All Copyright, Unauthorised reproduction infringes Crown Copyright and may be subject to prosecution under the provisions of the Copyright, Designs and Patents Act 1988.

## D Option costs



This page is left intentionally blank.

## SUMMARY BUDGET COSTINGS

Bridgefield Road to White Bridge	£537,985.00	
White Bridge to Green Bridge	£299,776.00	
Green Bridge to Red Bridge	£479,810.00	
Plant Protection & Service Diversions	£100,000.00	
New Bridge	£50,000.00	
Ancillary Works to paving/roads etc	£50,000.00	
Allowance for 'Optimism Bias @ 63%'	£956,069.73	Included in B/C
<b>Total Price of Civil Works</b>	<b>£1,517,571.00</b>	

Professional Fees @10% (Inc VAT)	£182,108.52
SI @ 1.5%	£22,763.57
Statutory Fees etc @ 2.5%	£37,939.28
<b>Total Project Cost</b>	<b>£1,760,382.36</b>

Note: No allowance has been made for land acquisition as it is assumed that no private land is required to build project.





<b>Project Code</b>	2011s4960					
<b>Project Title</b>	Stonehaven Flood Alleviation Scheme					
<b>Client</b>	Aberdeenshire Council					
<b>Option</b>	Storage					
<b>Ref</b>	<b>Extra</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>Rate</b>	<b>Amount</b>
		<b>Total Storage (combined)</b>				
		Total storage for 200 year event	m <sup>3</sup>	446800	£5.0	£2,234,000
		Land purchase	m <sup>3</sup>	446800	£1.5	£670,200
		<b>Plant Protection &amp; Service Diversions</b>				£200,000
		<b>Ancillary Works to paving/roads etc</b>				£500,000
					<b>Total</b>	<b>£3,604,200</b>

<b>Total Price of Civil Works</b>	<b>£3,604,200</b>
-----------------------------------	-------------------

Professional Fees @10% (Inc VAT)	£432,504
SI @ 1.5%	£54,063
Statutory Fees etc @ 2.5%	£90,105
<b>Total Project Cost</b>	<b>£4,180,872</b>

**Notes:**

1. Costs based on Morris, J., Vivash, R., Alsop, D., Lawson, C., Leeds-Harrison, P. & Bailey, A. (2002). ECONOMIC BASIS AND PRACTICALITIES OF WASHLAND CREATION ON THE SOMERSET LEVELS AND MOORS. A Report For: Somerset Levels and Moors, The Wise Use of Floodplains Project in Somerset.

## **E Baseline Flood damages**

This page is left intentionally blank.















1. REF.	2. GIS		3. RECEPTOR (PROPERTIES)				5. DEPTH OF FLOODING										6a. RESIDENTIAL CONSEQUENCES (EVENT DAMAGES) (£/dwelling)										6b. NRP CONSEQUENCES (EVENT DAMAGES) (£/dwelling)																
	A	B	C	D	E	F	G	H	I	J	K	L	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV				
No.	Easting	Northing	Property address	Postcode	Type	Property type	MCM Property code	Lookup ref	Threshold (MOD)	Area	Market Value	2-yr	5-yr	10-yr	25-yr	50-yr	75-yr	100-yr	200-yr	1000-yr	2-yr	5-yr	10-yr	25-yr	50-yr	75-yr	100-yr	200-yr	1000-yr	2-yr	5-yr	10-yr	25-yr	50-yr	75-yr	100-yr	200-yr	1000-yr					
4822	387317	786102	3 RODNEY TERRACE	AB39 2AW	Res	General Resider	13		8.27		175000	-1008.27	-1008.27	-1008.27	-1008.27	-1008.27	-1008.27	-1008.27	-1008.27	-1008.27	-1008.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
867	387318	786110	4 RODNEY TERRACE	AB39 2AW	Res	General Resider	13		8.21		175000	-1008.21	-1008.21	-1008.21	-1008.21	-1008.21	-1008.21	-1008.21	-1008.21	-1008.21	-1008.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
868	387327	786124	5 (a) RODNEY TERRACE	AB39 2AW	Res	General Resider	15		6.06		127000	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869	387327	786124	5 (b) RODNEY TERRACE	AB39 2AW	Res	General Resider	15		6.06		127000	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	-1006.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5155	387481	785778	1 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.40		175000	-1004.40	-1004.40	-1004.40	-1004.40	-1004.40	0.07	0.08	0.09	0.12	0.18	0	0	0	0	0	0	9256	9734	10629	12238	16306											
283	387456	785783	2 (a) SALMON LANE	AB39 2NZ	Res	General Resider	15		4.85		127000	-1004.85	-1004.85	-1004.85	-0.39	-0.25	-0.22	-0.20	-0.16	-0.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1584	387483	785784	3 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.46		175000	-1004.46	-1004.46	-1004.46	-1004.46	-0.18	-0.17	-0.15	-0.12	-0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
278	387458	785792	4 (a) SALMON LANE	AB39 2NZ	Res	General Resider	15		4.87		127000	-1004.87	-1004.87	-1004.87	-1004.87	-0.27	-0.23	-0.21	-0.16	-0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
279	387458	785792	4 (b) SALMON LANE	AB39 2NZ	Res	General Resider	15		4.87		127000	-1004.87	-1004.87	-1004.87	-1004.87	-0.27	-0.23	-0.21	-0.16	-0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4087	387485	785790	5 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.44		175000	-1004.44	-1004.44	-1004.44	-1004.44	0.03	0.04	0.05	0.08	0.14	0	0	0	0	0	0	0	5472	6570	8240	9674	13548											
272	387456	785808	6 (b) SALMON LANE	AB39 2NZ	Res	General Resider	15		4.86		127000	-1004.86	-1004.86	-1004.86	-1004.86	-0.26	-0.22	-0.20	-0.15	-0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4577	387456	785808	6 (a) SALMON LANE	AB39 2NZ	Res	General Resider	15		4.86		127000	-1004.86	-1004.86	-1004.86	-1004.86	-0.26	-0.22	-0.20	-0.15	-0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1585	387485	785795	7 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.52		175000	-1004.52	-1004.52	-1004.52	-1004.52	-0.05	-0.04	-0.02	0.00	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1631	9017				
1586	387486	785800	9 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.63		175000	-1004.63	-1004.63	-1004.63	-1004.63	-0.16	-0.11	-0.10	-0.09	-0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1587	387486	785805	11 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.65		175000	-1004.65	-1004.65	-1004.65	-1004.65	-0.36	-0.03	-0.02	0.00	0.06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1493	8718			
1588	387485	785808	13 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.70		175000	-1004.70	-1004.70	-1004.70	-1004.70	-0.08	-0.07	0.00	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1768	10928				
1589	387486	785815	15 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.89		175000	-1004.89	-1004.89	-1004.89	-1004.89	-1004.89	-0.26	-0.19	-0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1590	387485	785820	17 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.89		175000	-1004.89	-1004.89	-1004.89	-1004.89	-1004.89	-0.26	-0.23	-0.19	-0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1591	387486	785826	19 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.82		175000	-1004.82	-1004.82	-1004.82	-1004.82	-1004.82	-0.19	-0.16	-0.12	-0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1588	387485	785831	21 SALMON LANE	AB39 2NZ	Res	General Resider	13		4.75		175000	-1004.75	-1004.75	-1004.75	-1004.75	-1004.75	-0.12	-0.09	-0.05	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1593	387509	785761	Beach House SALMON LANE	AB39 2NZ	Res	General Resider	11		3.92		255000	-1003.92	-1003.92	-1003.92	-1003.92	0.08	0.22	0.30	0.38	0.52	0	0	0	0	0	0	0	13816	28578	33169	35265	38614											
1592	387489	785754	Riverside SALMON LANE	AB39 2NZ	Res	General Resider	11		4.03		255000	-1004.03	-1004.03	-1004.03	-1004.03	-0.03	0.11	0.19	0.27	0.39	0	0	0	0	0	0	0	0	17248	26025	31505	35411											
4090	387252	785591	1 SILVER GARDENS	AB39 2PH	Res	General Resider	12		5.46		192000	-1005.46	-1005.46	-1005.46	-1005.46	-1005.46	-1005.46	-1005.46	-1005.46	-1005.46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4649	387252	785584	3 SILVER GARDENS	AB39 2PH	Res	General Resider	12		5.47		192000	-1005.47	-1005.47	-1005.47	-1005.47	-1005.47	-1005.47	-1005.47	-1005.47	-1005.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1010	387493	786117	1 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.98		127000	-1003.98	-1003.98	-1003.98	-1003.98	-1003.98	-0.10	-0.09	-0.09	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3717	387493	786117	3 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.98		127000	-1003.98	-1003.98	-1003.98	-1003.98	-1003.98	-0.10	-0.09	-0.09	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1012	387493	786117	5 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.98		127000	-1003.98	-1003.98	-1003.98	-1003.98	-1003.98	-0.10	-0.09	-0.09	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3890	387493	786117	7 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.98		127000	-1003.98	-1003.98	-1003.98	-1003.98	-1003.98	-0.10	-0.09	-0.09	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1013	387516	786135	9 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.68		127000	-1003.68	-1003.68	-1003.68	-1003.68	0.12	0.23	0.25	0.26	0.30	0	0	0	0	0	0	0	19910	21302	21740	22347	23425											
1015	387516	786135	11 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.68		127000	-1003.68	-1003.68	-1003.68	-1003.68	0.12	0.23	0.25	0.26	0.30	0	0	0	0	0	0	0	19910	21302	21740	22347	23425											
1388	387516	786135	13 TURNERS COURT	AB39 2AE	Res	General Resider	15		3.68		127000	-1003.68	-1003																														

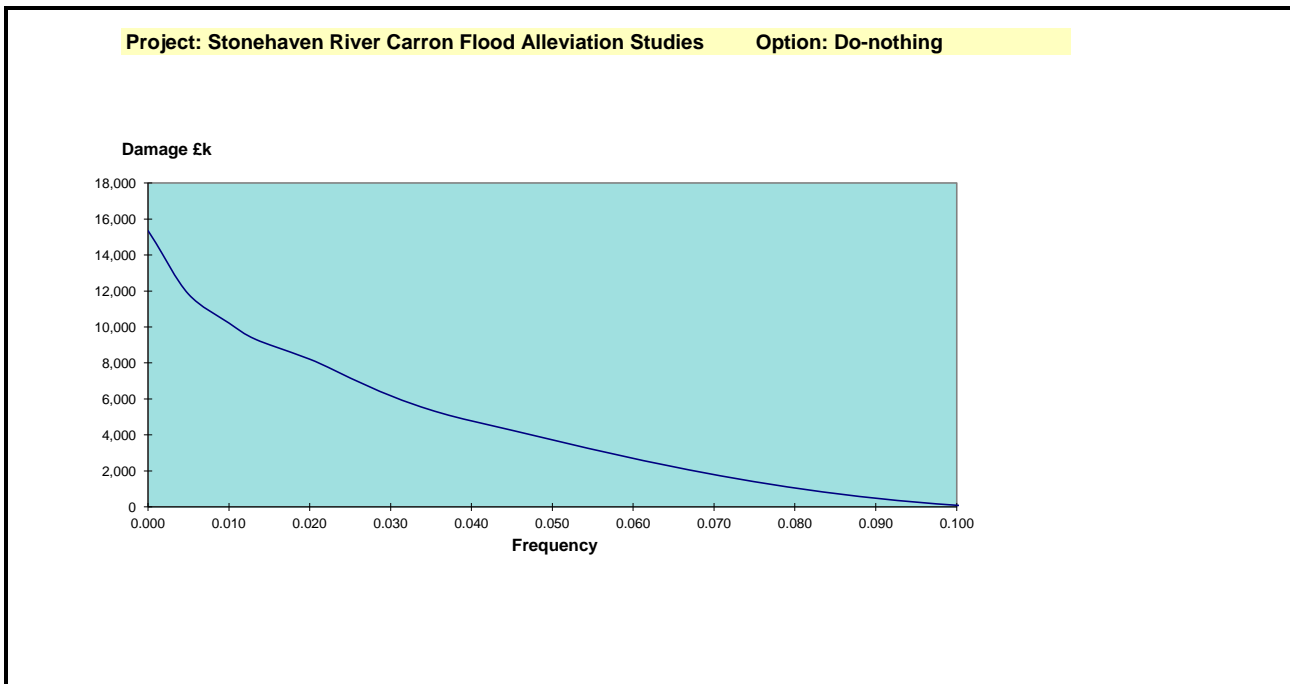
## **F Economic Appraisal summary tables**

This page is left intentionally blank.

Project Summary Sheet - Assessment of the Benefits of Current System					
<b>Client/Authority</b>			Prepared (date)		31/08/2011
Aberdeenshire Council			Printed		31/07/2012
<b>Project name</b>			Prepared by		AEP
Stonehaven River Carron Flood Alleviation Studies			Checked by		CA
<b>Project reference</b>			Checked date		31/07/2012
Base date for estimates (year 0)			2011s4960		
Scaling factor (e.g. £m, £k, £)			Jun-2011		
Year			£k		(used for all costs, losses and benefits)
Discount Rate			0	30	75
Optimism bias adjustment factor			3.5%	3.00%	2.50%
<b>Costs and benefits of options</b>			60%		
<b>Costs and benefits £k</b>					
Option name	Do-nothing	Resilience	Direct defences	Storage	Storage and direct defences
<b>COSTS:</b>					
PV capital costs	0	1,992	2,094	2,752	3,617
PV operation and maintenance costs	0	183	19	151	185
PV other (intermittent costs)	0	131	0	0	0
Optimism bias adjustment	0	1,383	1,268	1,742	2,281
<b>Total PV Costs £k excluding contributions</b>	0	3,689	3,382	4,646	6,083
<b>BENEFITS:</b>					
PV monetised flood damages	13,810	1,179	1,089	1,751	1,327
PV monetised flood damages avoided		12,631	12,721	12,059	12,483
PV monetised intangible damages	1,384	49	54	124	54
PV monetised intangible damages avoided (protected)		1,335	1,330	1,261	1,330
<b>Total monetised PV damages £k</b>	15,195	1,229	1,143	1,875	1,381
<b>Total monetised PV benefits £k</b>		3,492	14,051	13,319	13,813
<b>DECISION-MAKING CRITERIA:</b>					
<i>Based on monetised PV benefits (excludes benefits from scoring and weighting and ecosystem services)</i>					
Net Present Value NPV		-197	10,669	8,674	7,730
Average benefit/cost ratio BCR		0.9	4.2	2.9	2.3
Incremental benefit/cost ratio IBCR			-34.4	-0.6	0.3
Highest bcr					
<b>Comments and assumptions:</b>					



Summary Annual Average Damage										Sheet Nr.	2
<b>Client/Authority</b> Aberdeenshire Council											
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies											
<b>Project reference</b> 2011s4960											
<b>Base date for estimates (year 0)</b> 01/06/2011											
<b>Scaling factor (e.g. £m, £k, £)</b> £k											
<b>Discount rate</b> 3.5%											
<b>Option:</b> Do-nothing											
<b>First year of damage:</b> 0											
<b>Last year of period:</b> 99											
<b>PV factor for mid-year 0:</b> 29.813											
<b>Prepared (date)</b> 31/08/2011											
<b>Printed</b> 31/07/2012											
<b>Prepared by</b> AEP											
<b>Checked by</b> CA											
<b>Checked date</b> 31/07/2012											
<b>Applicable year (if time varying)</b> 											
Average waiting time (yrs) between events/frequency per year										Total PV	
5      10      25      50      75      100      200      1000      Infinity										£k	
0.200    0.100    0.040    0.020    0.013    0.010    0.005    0.001    0											
<b>Damage category</b>											
<b>Damage £k</b>											
Residential (direct)	0	76	2214	3885	4575	5143	5957	7406	7769	7154	
Ind/commercial (direct)	0	0	2155	3631	3928	4181	4839	5950	6228	6304	
Residential (indirect)	0	10	290	479	550	613	701	881	926	893	
Traffic related (indirect)	0	0	0	0	0	0	0	0	0	0	
Emergency services (indirect)	0	4	124	218	256	288	334	415	435	401	
Other (indirect)	0	0	0	0	0	0	0	0	0	0	
Total damage £k	0	91	4783	8212.6	9309.7	10224.6	11830.3	14652.3	15357.8	14751	
Area (direct damage x frequency)		4	133	118.8	53.4	29.7	50.3	48.3	13.7		
Area (indirect damage x frequency)		1	13	11.1	5.0	2.8	4.8	4.7	1.3		
Total area, as above for direct damages					451.42						
Total area, as above for indirect damages					43.38						
PV Factor, as above					29.813						
Present value for direct damages					13458						
Present value for indirect damages					1293						
Present value - total (uncapped)					14751						
Present value for direct damages - capped					12517						
<b>Present value - total (capped)</b>					<b>£13,810</b>						
<b>Notes</b>											
Area calculations assume drop to zero at maximum frequency.											
Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.											
One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life (e.g. sea-level rise)											
Residential property, Industrial / commercial (direct), and Other damages are itemised in Asset AAD sheet and automatically linked to this sheet											



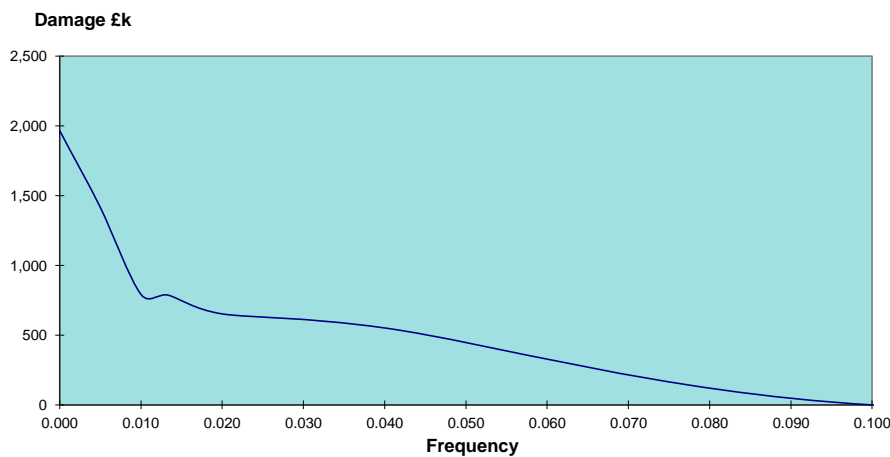
Asset Annual Average Damage - Residential										Sheet Nr.	3a
<b>Client/Authority</b> Aberdeenshire Council											
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies											
<b>Project reference</b> 2011s4960											
<b>Option:</b> Do-nothing											
Base date for estimates (year 0) =Summary!C7											
Prepared (date) 31/08/2011											
Scaling factor (e.g. £m, £k, £) £k											
Printed 31/07/2012											
Discount rate 3.5%											
Prepared by AEP											
Checked by CA											
Checked date 31/07/2012											
Applicable year (if time varying)											
Average waiting time (yrs) between events/frequency per year											
	5	10	25	50	75	100	200	1000	infinity		
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0		
<b>Residential property</b>											
	Damages £k									Annual Damage £k/ year	
Residential	0	76.35023	2213.564	3884.9	4575.2	5142.9	5956.6	7406.4	7768.8751		239.96
									0.0		0.00
									0.0		0.00
									0		0.00
<b>Total Residential (£k)</b>	0	76.35023	2213.564	3884.858	4575.166	5142.875	5956.644	7406.429	7768.8751		239.96
<b>(transferred to AAD)</b>											

Notes  
 Area calculations assume drop to zero at maximum frequency.  
 Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.  
 One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life  
 Annual damage should not exceed write-off value for a property  
 This sheet links to Summary AAD

Asset Annual Average Damage - Industrial/Commercial										Sheet Nr.	3b
<b>Client/Authority</b> Aberdeenshire Council											
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies											
<b>Project reference</b> 2011s4960											
<b>Option:</b> Do-nothing											
Base date for estimates (year 0) =Summary!C7											
Prepared (date) 31/08/2011											
Scaling factor (e.g. £m, £k, £) £k											
Printed 31/07/2012											
Discount rate 3.5%											
Prepared by AEP											
Checked by CA											
Checked date 31/07/2012											
Applicable year (if time varying)											
Average waiting time (yrs) between events/frequency per year											
	5	10	25	50	75	100	200	1000	infinity		
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0.000		
<b>Industrial / commercial (direct)</b>											
	Damages £k									Annual Damage £k/ year	
Non Residential	0	0	2155.356	3631.1	3927.8	4181.3	4839.4	5950.3	6228.03412		211.46
									0.0		0.00
									0.0		0.00
									0		0.00
<b>Total Ind - Com (£k)</b>	0	0	2155.356	3631.0984	3927.8437	4181.2625	4839.416	5950.3105	6228.03412		211.46
<b>(transferred to C1,2)</b>											

Summary Annual Average Damage										Sheet Nr.	4																							
<b>Client/Authority</b> Aberdeenshire Council																																		
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies																																		
<b>Project reference</b> 2011s4960																																		
Base date for estimates (year 0)			01/06/2011			First year of damage:			0		Prepared (date)		31/08/2011																					
Scaling factor (e.g. £m, £k, £)			£k			Last year of period:			99		Printed		31/07/2012																					
Discount rate			3.5%			PV factor for mid-year 0:			29.813		Prepared by		AEP																					
Applicable year (if time varying)											Checked by		CA																					
											Checked date		31/07/2012																					
Average waiting time (yrs) between events/frequency per year											Total PV																							
											£k																							
<table border="1"> <thead> <tr> <th></th> <th>5</th> <th>10</th> <th>25</th> <th>50</th> <th>75</th> <th>100</th> <th>200</th> <th>1000</th> <th>Infinity</th> <th></th> </tr> <tr> <th></th> <th>0.200</th> <th>0.100</th> <th>0.040</th> <th>0.020</th> <th>0.013</th> <th>0.010</th> <th>0.005</th> <th>0.001</th> <th></th> <th></th> </tr> </thead> </table>												5	10	25	50	75	100	200	1000	Infinity			0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001				
	5	10	25	50	75	100	200	1000	Infinity																									
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001																										
<b>Damage category</b>																																		
<b>Damage £k</b>																																		
Residential (direct)	0	0	185.7985	192	269	270	302	575	643		464																							
Ind/commercial (direct)	0	0	332.8709	427.1025	473	476	1062	1180	1210		945																							
Residential (indirect)	0	0	22	22	30	30	34	67	75		54																							
Traffic related (indirect)	0	0	0	0	0	0	0	0	0		0																							
Emergency services (indirect)	0	0	10.40471	10.74265	15.0646803	15.13838	16.89081	32.20622	36		26																							
Other (indirect)	0	0	0	0	0	0	0	0	0		0																							
											0																							
											0																							
											0																							
<b>Total damage £k</b>	0	0	551	652.0	786.4	791.6	1414.0	1854.4	1964.5																									
Area (direct damage x frequency)			16	11.4	4.5	2.5	5.3	6.2	1.8																									
Area (indirect damage x frequency)			1	0.7	0.3	0.1	0.2	0.3	0.1																									
Total area, as above for direct damages											47.27																							
Total area, as above for indirect damages											2.69																							
PV Factor, as above											29.813																							
Present value for direct damages											1409																							
Present value for indirect damages											80																							
Present value - total (uncapped)											1490																							
Present value for direct damages - capped											1099	Calculated externally on individual properties																						
<b>Present value - total (capped)</b>											<b>£1,179</b>																							
<b>Notes</b>																																		
Area calculations assume drop to zero at maximum frequency.																																		
Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.																																		
One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life (e.g. sea-level rise)																																		
Residential property, Industrial / commercial (direct), and Other damages are itemised in Asset AAD sheet and automatically linked to this sheet																																		

**Project: Stonehaven River Carron Flood Alleviation Studies Option: Resilience**



Asset Annual Average Damage - Residential											Sheet Nr.	5a	
Client/Authority												Aberdeenshire Council	
Project name												Stonehaven River Carron Flood Alleviation Studies	
Project reference												2011s4960	
Option:												Resilience	
Base date for estimates (year 0)												=Summary!C7	
Scaling factor (e.g. £m, £k, £)												£k	
Discount rate												3.5%	
Prepared (date)												31/08/2011	
Printed												31/07/2012	
Prepared by												AEP	
Checked by												CA	
Checked date												31/07/2012	
Applicable year (if time varying)													
Average waiting time (yrs) between events/frequency per year													
	5	10	25	50	75	100	200	1000	infinity				
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0				
Residential property											Damages £k	Annual Damage £k/ year	
Residential	0	0.0	185.8	191.8	269.0	270.3	301.6	575.1	643.4834864		15.58		
										0.0	0.00		
										0.0	0.00		
										0	0.00		
<b>Total Residential (£k)</b>	<b>0</b>	<b>0</b>	<b>185.7985</b>	<b>191.8</b>	<b>269.0</b>	<b>270.3</b>	<b>301.6</b>	<b>575.1</b>	<b>643.5</b>		<b>15.58</b>		
<b>(transferred to AAD)</b>													

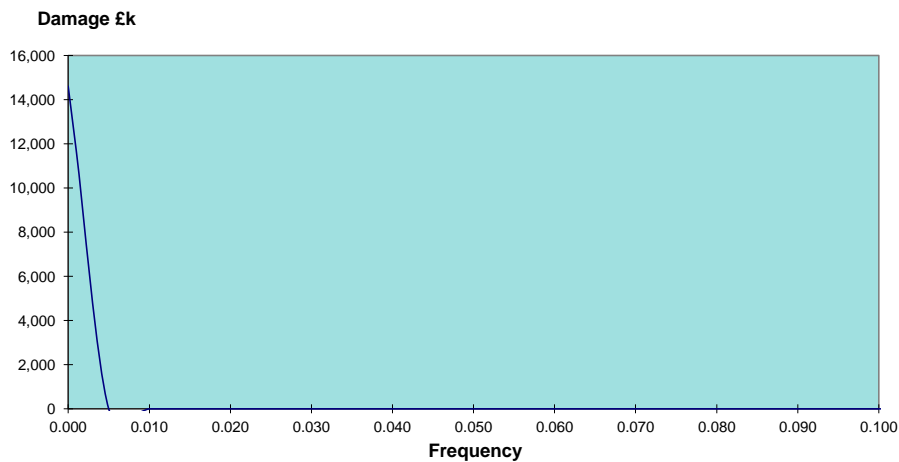
Notes  
 Area calculations assume drop to zero at maximum frequency.  
 Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.  
 One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life  
 Annual damage should not exceed write-off value for a property  
 This sheet links to Summary AAD

Asset Annual Average Damage - Industrial/Commercial											Sheet Nr.	5b	
Client/Authority												Aberdeenshire Council	
Project name												Stonehaven River Carron Flood Alleviation Studies	
Project reference												2011s4960	
Option:												Resilience	
Base date for estimates (year 0)												=Summary!C7	
Scaling factor (e.g. £m, £k, £)												£k	
Discount rate												3.5%	
Prepared (date)												31/08/2011	
Printed												31/07/2012	
Prepared by												AEP	
Checked by												CA	
Checked date												31/07/2012	
Applicable year (if time varying)												0	
Average waiting time (yrs) between events/frequency per year													
	5	10	25	50	75	100	200	1000	infinity				
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0.000				
Industrial / commercial (direct)											Damages £k	Annual Damage £k/ year	
Non Residential	0	0	332.8709	427.1025	472.5392	476.3677	1061.995	1180.023	1209.52941		31.69		
										0.0	0.00		
										0.0	0.00		
										0	0.00		
<b>Total Ind - Com (£k)</b>	<b>0</b>	<b>0</b>	<b>332.8709</b>	<b>427.1025</b>	<b>472.5392</b>	<b>476.4</b>	<b>1062.0</b>	<b>1180.0</b>	<b>1209.52941</b>		<b>31.69</b>		
<b>(transferred to C1,2)</b>													



Summary Annual Average Damage										Sheet Nr.	6																						
<b>Client/Authority</b> Aberdeenshire Council																																	
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies																																	
<b>Project reference</b> 2011s4960																																	
<b>Option:</b> Direct defences																																	
Base date for estimates (year 0) 01/06/2011																																	
First year of damage: 0 Prepared (date) 31/08/2011																																	
Scaling factor (e.g. £m, £k, £) £k																																	
Last year of period: 99 Printed 31/07/2012																																	
Discount rate 3.5%																																	
PV factor for mid-year 0: 29.813 Prepared by AEP																																	
Checked by CA																																	
Checked date 31/07/2012																																	
Applicable year (if time varying)																																	
Average waiting time (yrs) between events/frequency per year										Total PV																							
										£k																							
<table border="1"> <thead> <tr> <th></th> <th>5</th> <th>10</th> <th>25</th> <th>50</th> <th>75</th> <th>100</th> <th>200</th> <th>1000</th> <th>Infinity</th> <th></th> </tr> <tr> <th></th> <th>0.200</th> <th>0.100</th> <th>0.040</th> <th>0.020</th> <th>0.013</th> <th>0.010</th> <th>0.005</th> <th>0.001</th> <th>0</th> <th></th> </tr> </thead> </table>											5	10	25	50	75	100	200	1000	Infinity			0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0			
	5	10	25	50	75	100	200	1000	Infinity																								
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0																								
<b>Damage category</b>																																	
<b>Damage £k</b>																																	
Residential (direct)	0	0	0	0	0	0	0	5957	7446	555																							
Ind/commercial (direct)	0	0	0	0	0	0	0	4839	6049	451																							
Residential (indirect)	0	0	0	0	0	0	0	560	700	52																							
Traffic related (indirect)	0	0	0	0	0	0	0	0	0	0																							
Emergency services (indirect)	0	0	0	0	0	0	0	333.57204	417	31																							
Other (indirect)	0	0	0	0	0	0	0	0	0	0																							
										0																							
										0																							
										0																							
<b>Total damage £k</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>11689.5</b>	<b>14611.9</b>																								
Area (direct damage x frequency)				0.0	0.0	0.0	0.0	21.6	12.1																								
Area (indirect damage x frequency)				0.0	0.0	0.0	0.0	1.8	1.0																								
Total area, as above for direct damages										33.74																							
Total area, as above for indirect damages										2.79																							
PV Factor, as above										29.813																							
Present value for direct damages										1006																							
Present value for indirect damages										83																							
Present value - total (uncapped)										1089																							
Present value for direct damages - capped										1006																							
<b>Present value - total (capped)</b>										<b>£1,089</b>																							
<b>Notes</b>																																	
Area calculations assume drop to zero at maximum frequency.																																	
Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.																																	
One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life (e.g. sea-level rise)																																	
Residential property, Industrial / commercial (direct), and Other damages are itemised in Asset AAD sheet and automatically linked to this sheet																																	

**Project: Stonehaven River Carron Flood Alleviation Studies Option: Direct defences**



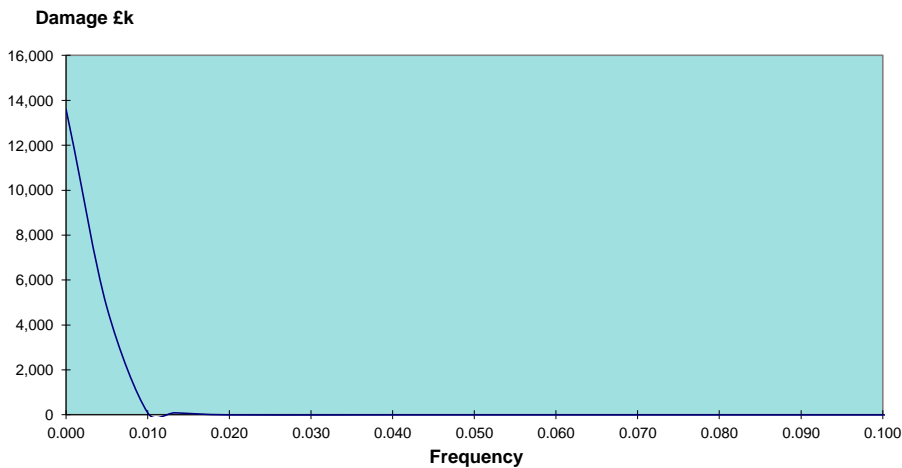
Asset Annual Average Damage - Residential										Sheet Nr.	7a
Client/Authority Aberdeenshire Council											
Project name Stonehaven River Carron Flood Alleviation Studies											
Option: Direct defences											
Project reference 2011s4960											
Base date for estimates (year 0) =Summary!C7											
Prepared (date) 31/08/2011											
Scaling factor (e.g. £m, £k, £) £k											
Printed 31/07/2012											
Discount rate 3.5%											
Prepared by AEP											
Checked by CA											
Checked date 31/07/2012											
Applicable year (if time varying) 0											
Average waiting time (yrs) between events/frequency per year											
	5	10	25	50	75	100	200	1000	infinity		
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0		
Residential property											
Damages £k										Annual Damage £k/ year	
Residential	0	0.0	0.0	0.0	0.0	0.0	0.0	5956.6	7445.8044		18.61
									0.0		0.00
									0.0		0.00
									0		0.00
<b>Total Residential (£k)</b>	0	0	0	0	0	0	0	5956.644	7445.8044		18.61
<b>(transferred to AAD)</b>											

Asset Annual Average Damage - Industrial/Commercial										Sheet Nr.	7b
Client/Authority Aberdeenshire Council											
Project name Stonehaven River Carron Flood Alleviation Studies											
Option: Direct defences											
Project reference 2011s4960											
Base date for estimates (year 0) =Summary!C7											
Prepared (date) 31/08/2011											
Scaling factor (e.g. £m, £k, £) £k											
Printed 31/07/2012											
Discount rate 3.5%											
Prepared by AEP											
Checked by CA											
Checked date 31/07/2012											
Applicable year (if time varying) 0											
Average waiting time (yrs) between events/frequency per year											
	5	10	25	50	75	100	200	1000	infinity		
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0.000		
Industrial / commercial (direct)											
Damages £k										Annual Damage £k/ year	
Non Residential	0	0	0	0	0	0	0	4839.4	6049.26995		15.12
									0.0		0.00
									0.0		0.00
									0		0.00
<b>Total Ind - Com (£k)</b>	0	0	0	0	0	0	0	4839.416	6049.26995		15.12
<b>(transferred to C1,2)</b>											

Notes  
 Area calculations assume drop to zero at maximum frequency.  
 Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.  
 One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life  
 Annual damage should not exceed write-off value for a property  
 This sheet links to Summary AAD

Summary Annual Average Damage										Sheet Nr.	8																						
<b>Client/Authority</b> Aberdeenshire Council																																	
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies																																	
<b>Project reference</b> 2011s4960																																	
Base date for estimates (year 0) 01/06/2011																																	
Scaling factor (e.g. £m, £k, £) £k																																	
Discount rate 3.5%																																	
<b>Option:</b> Storage																																	
First year of damage: 0 Prepared (date) 31/08/2011																																	
Last year of period: 99 Printed 31/07/2012																																	
PV factor for mid-year 0: 29.813 Prepared by AEP																																	
Checked by CA																																	
Checked date 31/07/2012																																	
Applicable year (if time varying)																																	
Average waiting time (yrs) between events/frequency per year										Total PV																							
										£k																							
<table border="1"> <thead> <tr> <th></th> <th>5</th> <th>10</th> <th>25</th> <th>50</th> <th>75</th> <th>100</th> <th>200</th> <th>1000</th> <th>Infinity</th> <th></th> </tr> <tr> <th></th> <th>0.200</th> <th>0.100</th> <th>0.040</th> <th>0.020</th> <th>0.013</th> <th>0.010</th> <th>0.005</th> <th>0.001</th> <th>0</th> <th></th> </tr> </thead> </table>											5	10	25	50	75	100	200	1000	Infinity			0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0			
	5	10	25	50	75	100	200	1000	Infinity																								
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0																								
<b>Damage category</b>																																	
<b>Residential (direct)</b>																																	
<b>Ind/commercial (direct)</b>																																	
<b>Residential (indirect)</b>																																	
<b>Traffic related (indirect)</b>																																	
<b>Emergency services (indirect)</b>																																	
<b>Other (indirect)</b>																																	
<b>Total damage £k</b>																																	
<b>Area (direct damage x frequency)</b>																																	
<b>Area (indirect damage x frequency)</b>																																	
<b>Total area, as above for direct damages</b>																																	
<b>Total area, as above for indirect damages</b>																																	
<b>PV Factor, as above</b>																																	
<b>Present value for direct damages</b>																																	
<b>Present value for indirect damages</b>																																	
<b>Present value - total (uncapped)</b>																																	
<b>Present value for direct damages - capped</b>																																	
<b>Present value - total (capped)</b>																																	
<b>Notes</b>																																	
Area calculations assume drop to zero at maximum frequency.																																	
Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.																																	
One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life (e.g. sea-level rise)																																	
Residential property, Industrial / commercial (direct), and Other damages are itemised in Asset AAD sheet and automatically linked to this sheet																																	

**Project: Stonehaven River Carron Flood Alleviation Studie Option: Storage**



Asset Annual Average Damage - Residential										Sheet Nr. 9a
Client/Authority Aberdeenshire Council										
Project name Stonehaven River Carron Flood Alleviation Studies										
Option: Storage										
Project reference 2011s4960										
Base date for estimates (year 0) 01/06/2011										
Prepared (date) 31/08/2011										
Scaling factor (e.g. £m, £k, £) £k										
Printed 31/07/2012										
Discount rate 3.5%										
Prepared by AEP										
Checked by CA										
Checked date 31/07/2012										
Applicable year (if time varying)										
Average waiting time (yrs) between events/frequency per year										
	5	10	25	50	75	100	200	1000	infinity	
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0	
Residential property										
	Damages £k									Annual Damage £k/ year
Residential	0	0	0.0	0.0	76.4	76.4	2213.6	5956.6	6892.4134	29.00
									0.0	0.00
									0.0	0.00
									0	0.00
<b>Total Residential (£k)</b>	0	0	0	0.0	76.4	76.4	2213.6	5956.6	6892.4	29.00
<b>(transferred to AAD)</b>										

Notes  
 Area calculations assume drop to zero at maximum frequency.  
 Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.  
 One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life  
 Annual damage should not exceed write-off value for a property  
 This sheet links to Summary AAD

Asset Annual Average Damage - Industrial/Commercial										Sheet Nr. 9b
Client/Authority Aberdeenshire Council										
Project name Stonehaven River Carron Flood Alleviation Studies										
Option: Storage										
Project reference 2011s4960										
Base date for estimates (year 0) Jun-11										
Prepared (date) 31/08/2011										
Scaling factor (e.g. £m, £k, £) £k										
Printed 31/07/2012										
Discount rate 3.5%										
Prepared by AEP										
Checked by CA										
Checked date 31/07/2012										
Applicable year (if time varying) 0										
Average waiting time (yrs) between events/frequency per year										
	5	10	25	50	75	100	200	1000	infinity	
	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.001	0.000	
Industrial / commercial (direct)										
	Damages £k									Annual Damage £k/ year
Non Residential	0	0	0.0	0.0	0.0	0.0	2155.4	4839.4	5510.43094	24.55
									0.0	0.00
									0.0	0.00
									0	0.00
<b>Total Ind - Com (£k)</b>	0	0	0	0	0	0.0	2155.4	4839.4	5510.43094	24.55
<b>(transferred to C1,2)</b>										





Asset Annual Average Damage - Residential										Sheet Nr. 12a	
<b>Client/Authority</b> Aberdeenshire Council											
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies											
<b>Option:</b> Direct defences											
<b>Project reference</b> 2011s4960											
Base date for estimates (year 0) Jan-2003			Prepared (date) 31/08/2011			Printed 31/07/2012			Prepared by AEP		
Scaling factor (e.g. £m, £k, £) £k			Checked by CA			Checked date 31/07/2012			Discount rate 3.5%		
Applicable year (if time varying)											
Average waiting time (yrs) between events/frequency per year											
	2	5	10	25	50	75	100	200	infinity		
	0.500	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0		
<b>Residential property</b>											
	Damages £k									Annual Damage £k/ year	
Residential	0	0	0	0.0	0.0	0.0	0.0	5956.6	11913.2871	59.57	
									0.0	0.00	
									0.0	0.00	
									0	0.00	
<b>Total Residential (£k)</b>	0	0	0	0.0	0.0	0.0	0.0	5956.6	11913.3	59.57	
<b>(transferred to AAD)</b>											

Notes  
 Area calculations assume drop to zero at maximum frequency.  
 Default value for the highest possible damage assumes continuation of gradient for last two points, an alternative value can be entered, if appropriate.  
 One form should be completed for each option, including 'without project', and for each representative year if profile changes during scheme life  
 Annual damage should not exceed write-off value for a property  
 This sheet links to Summary AAD

Asset Annual Average Damage - Industrial/Commercial										Sheet Nr. 12b	
<b>Client/Authority</b> Aberdeenshire Council											
<b>Project name</b> Stonehaven River Carron Flood Alleviation Studies											
<b>Option:</b> Direct defences											
<b>Project reference</b> 2011s4960											
Base date for estimates (year 0) Jan-03			Prepared (date) 31/08/2011			Printed 31/07/2012			Prepared by AEP		
Scaling factor (e.g. £m, £k, £) £k			Checked by CA			Checked date 31/07/2012			Discount rate 3.5%		
Applicable year (if time varying)											
Average waiting time (yrs) between events/frequency per year											
	2	5	10	25	50	75	100	200	infinity		
	0.500	0.200	0.100	0.040	0.020	0.013	0.010	0.005	0.000		
<b>Industrial / commercial (direct)</b>											
	Damages £k									Annual Damage £k/ year	
Non Residential	0	0	0	0.0	0.0	0.0	0.0	4839.4	9678.83192	48.39	
									0.0	0.00	
									0.0	0.00	
									0	0.00	
<b>Total Ind - Com (£k)</b>	0	0	0	0	0.0	0.0	0.0	4839.4	9678.83192	48.39	
<b>(transferred to C1.2)</b>											

**Indirect Losses - propret counts**

Sheet Nr. 10a

**Client/Authority**

Aberdeenshire Council

**Project name**

Stonehaven River Carron Flood Alleviation Studies

Prepared (date)

31/08/2011

Printed

31/07/2012

Prepared by

AEP

Checked by

CA

Checked date

31/07/2012

**Number of residential properties flooded above threshold**

	2	5	10	25	50	75	100	200	1000
Do-nothing	0	0	5	108	194	216	244	269	317
Resilience	0	0	0	6	6	8	8	9	18
Direct defences	0	0	0	0	0	0	0	0	317
Storage	0	0	0	0	0	5	5	108	269
Storage and direct defences	0	0	0	0	0	0	0	0	317

**Number of residential properties flooded above 300 mm**

	2	5	10	25	50	75	100	200	1000
Do-nothing	0	0	0	47	71	86	98	121	175
Resilience	0	0	0	6	6	8	8	9	18
Direct defences	0	0	0	0	0	0	0	0	175
Storage	0	0	0	0	0	0	0	47	121
Storage and direct defences	0	0	0	0	0	0	0	0	175

**Number of residential properties flooded below 100 mm**

	2	5	10	25	50	75	100	200	1000
Do-nothing	0	0	5	64	99	99	99	90	60
Resilience	0	0	0	0	0	0	0	0	0
Direct defences	0	0	0	0	0	0	0	0	60
Storage	0	0	0	0	0	5	5	64	90
Storage and direct defences	0	0	0	0	0	0	0	0	60

**Number of residential properties flooded above 100 mm**

	2	5	10	25	50	75	100	200	1000
Do-nothing	0	0	4	88	156	181	203	232	287
Resilience	0	0	0	6	6	8	8	9	18
Direct defences	0	0	0	0	0	0	0	0	60
Storage	0	0	0	0	0	4	4	88	232
Storage and direct defences	0	0	0	0	0	0	0	0	60

**Indirect Losses - damages**

Sheet Nr. 10b

**Client/Authority**

Aberdeenshire Council

**Project name**

Stonehaven River Carron Flood Alleviation Studies

Prepared (date)

31/08/2011

Printed

31/07/2012

Prepared by

AEP

Checked by

CA

Checked date

31/07/2012

**Rented Accommodation Costs (£k)**

(64% of households flooded to a depth greater than 300 mm will be in temporary accommodation for an average of 22 weeks)  
Rented accommodation costs for a property = £150.00 per week

	2	5	10	25	50	75	100	200	1000
Do-nothing	0.0	0.0	0.0	99.3	150.0	181.6	207.0	255.6	369.6
Resilience	0.0	0.0	0.0	12.7	12.7	16.9	16.9	19.0	38.0
Direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	369.6
Storage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.3	255.6
Storage and direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	369.6

**Drying Out Costs for properties flooded less than 0.1m (£k)**

Rental costs including in depth damage curves, but electrical cost of running dehumidifiers not included

	2	5	10	25	50	75	100	200	1000
Do-nothing	0.0	0.0	3.5	45.2	70.0	70.0	70.0	63.6	42.4
Resilience	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.4
Storage	0.0	0.0	0.0	0.0	0.0	3.5	3.5	45.2	63.6
Storage and direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.4

**Drying Out Costs for properties flooded greater than 0.1m (£k)**

Rental costs including in depth damage curves, but electrical cost of running dehumidifiers not included

	2	5	10	25	50	75	100	200	1000
Do-nothing	0.0	0.0	5.7	124.4	220.6	255.9	287.0	328.1	405.8
Resilience	0.0	0.0	0.0	8.5	8.5	11.3	11.3	12.7	25.5
Direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.8
Storage	0.0	0.0	0.0	0.0	0.0	5.7	5.7	124.4	328.1
Storage and direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.8

**Additional Heating Costs (£k)**

@ £170 per property

	2	5	10	25	50	75	100	200	1000
Do-nothing	0.0	0.0	1.0	21.5	38.6	42.9	48.5	53.5	63.0
Resilience	0.0	0.0	0.0	1.2	1.2	1.6	1.6	1.8	3.6
Direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.0
Storage	0.0	0.0	0.0	0.0	0.0	1.0	1.0	21.5	53.5
Storage and direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.0

**Total indirect damages**

Sum of above

	2	5	10	25	50	75	100	200	1000
Do-nothing	0.0	0.0	10.2	290.4	479.1	550.5	612.5	700.7	880.8
Resilience	0.0	0.0	0.0	22.3	22.3	29.8	29.8	33.5	67.0
Direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	559.9
Storage	0.0	0.0	0.0	0.0	0.0	10.2	10.2	290.4	700.7
Storage and direct defences	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	559.9



**Calculation of intangible damages based on level of flood risk**

Sheet Nr. 11

**Client/Authority**

Aberdeenshire Council

**Project name**

Stonehaven River Carron Flood Alleviation Studies

Prepared (date)

31/08/2011

Printed

31/07/2012

Prepared by

AEP

Checked by

CA

Checked date

31/07/2012

**Number of residential properties flooded (cumulative)**

SOP	1	0.5	0.2	0.1	0.04	0.02	0.013	0.01	0.005
Return Period	2	5	10	25	50	75	100	200	1000
Do-nothing	0	0	5	108	194	216	244	269	317
Resilience	0	0	0	6	6	8	8	9	18
Direct defences	0	0	0	0	0	0	0	0	317
Storage	0	0	0	0	0	5	5	108	269
Storage and direct defences	0	0	0	0	0	0	0	0	317

**Number of residential properties flooded (per return period)**

	2	5	10	25	50	75	100	200	1000
Do-nothing	0	0	5	103	86	22	28	25	48
Resilience	0	0	0	6	0	2	0	1	9
Direct defences	0	0	0	0	0	0	0	0	317
Storage	0	0	0	0	0	5	0	103	161
Storage and direct defences	0	0	0	0	0	0	0	0	317

**Number of residential properties flooded (per return period)**

$$\text{Damages} = 225 \times \{1.026 - (1/(1+37.5e-0.06/AFP))\}$$

	2	5	10	25	50	75	100	200	1000	Total AAD (£)	Total AAD (£k)	PVd (£k)
Do-nothing	0	0	1115.16	22704	17787	3352	2016	625	283	47883	47.9	1384.4
Resilience	0	0	0	1323	0	305	0	25	53	1705	1.7	49.3
Direct defences	0	0	0	0	0	0	0	0	1871	1871	1.9	54.1
Storage	0	0	0	0	0	762	0	2574	950	4286	4.3	123.9
Storage and direct defences	0	0	0	0	0	0	0	0	1871	1871	1.9	54.1

Adapted from: *The Appraisal of Human-Related Intangible Impacts of Flooding. R&D Technical Report FD2005/TR.*  
DEFRA/EA Flood and Coastal Defence R&D Programme.



**Whole life cost and PVC analysis**

Sheet No. 13

**Do-nothing**

Year 0 capital cost (£k)	0
Annual maintenance cost (£k)	0
Intermittent cost (£k)	0
Intermittent works frequency (years)	100

**Resilience**

Year 0 capital cost (£k)	1991.68
Annual maintenance cost (£k)	6.34
Intermittent cost (£k)	183.37
Intermittent works frequency (years)	25

**Direct defences**

Year 0 capital cost (£k)	2094.41
Annual maintenance cost (£k)	0.67
Intermittent cost (£k)	0.00
Intermittent works frequency (years)	100

**Storage**

Year 0 capital cost (£k)	2752.2411
Annual maintenance cost (£k)	5.3
Intermittent cost (£k)	0
Intermittent works frequency (years)	100

Prepared (date) 00/01/1900  
Printed  
Prepared by 0

**Storage and direct defences**

Year 0 capital cost (£k)	3617.072
Annual maintenance cost (£k)	6.4
Intermittent cost (£k)	0
Intermittent works frequency (years)	100

Year	Initial discount rate 3.5% 29.813					Total PVC (£k): 0				
	TOTALS:					TOTALS:				
	Cash sum	Capital	Maint.	Other	Negative costs	Cash	PV			
0	1.000	0.0	0.0	0.0	0.0	0.0	0.0			
1	0.966	0.0	0.0	0.0	0.0	0.0	0.0			
2	0.934	0.0	0.0	0.0	0.0	0.0	0.0			
3	0.902	0.0	0.0	0.0	0.0	0.0	0.0			
4	0.871	0.0	0.0	0.0	0.0	0.0	0.0			
5	0.842	0.0	0.0	0.0	0.0	0.0	0.0			
6	0.814	0.0	0.0	0.0	0.0	0.0	0.0			
7	0.786	0.0	0.0	0.0	0.0	0.0	0.0			
8	0.759	0.0	0.0	0.0	0.0	0.0	0.0			
9	0.734	0.0	0.0	0.0	0.0	0.0	0.0			
10	0.709	0.0	0.0	0.0	0.0	0.0	0.0			
11	0.685	0.0	0.0	0.0	0.0	0.0	0.0			
12	0.662	0.0	0.0	0.0	0.0	0.0	0.0			
13	0.639	0.0	0.0	0.0	0.0	0.0	0.0			
14	0.618	0.0	0.0	0.0	0.0	0.0	0.0			
15	0.597	0.0	0.0	0.0	0.0	0.0	0.0			
16	0.577	0.0	0.0	0.0	0.0	0.0	0.0			
17	0.557	0.0	0.0	0.0	0.0	0.0	0.0			
18	0.538	0.0	0.0	0.0	0.0	0.0	0.0			
19	0.520	0.0	0.0	0.0	0.0	0.0	0.0			
20	0.503	0.0	0.0	0.0	0.0	0.0	0.0			
21	0.486	0.0	0.0	0.0	0.0	0.0	0.0			
22	0.469	0.0	0.0	0.0	0.0	0.0	0.0			
23	0.453	0.0	0.0	0.0	0.0	0.0	0.0			
24	0.438	0.0	0.0	0.0	0.0	0.0	0.0			
25	0.423	0.0	0.0	0.0	0.0	0.0	0.0			
26	0.409	0.0	0.0	0.0	0.0	0.0	0.0			
27	0.395	0.0	0.0	0.0	0.0	0.0	0.0			
28	0.382	0.0	0.0	0.0	0.0	0.0	0.0			
29	0.369	0.0	0.0	0.0	0.0	0.0	0.0			
30	0.356	0.0	0.0	0.0	0.0	0.0	0.0			
31	0.346	0.0	0.0	0.0	0.0	0.0	0.0			
32	0.336	0.0	0.0	0.0	0.0	0.0	0.0			
33	0.326	0.0	0.0	0.0	0.0	0.0	0.0			
34	0.317	0.0	0.0	0.0	0.0	0.0	0.0			
35	0.307	0.0	0.0	0.0	0.0	0.0	0.0			
36	0.298	0.0	0.0	0.0	0.0	0.0	0.0			
37	0.290	0.0	0.0	0.0	0.0	0.0	0.0			
38	0.281	0.0	0.0	0.0	0.0	0.0	0.0			
39	0.273	0.0	0.0	0.0	0.0	0.0	0.0			
40	0.265	0.0	0.0	0.0	0.0	0.0	0.0			
41	0.257	0.0	0.0	0.0	0.0	0.0	0.0			
42	0.250	0.0	0.0	0.0	0.0	0.0	0.0			
43	0.243	0.0	0.0	0.0	0.0	0.0	0.0			
44	0.236	0.0	0.0	0.0	0.0	0.0	0.0			
45	0.229	0.0	0.0	0.0	0.0	0.0	0.0			
46	0.222	0.0	0.0	0.0	0.0	0.0	0.0			
47	0.216	0.0	0.0	0.0	0.0	0.0	0.0			
48	0.209	0.0	0.0	0.0	0.0	0.0	0.0			
49	0.203	0.0	0.0	0.0	0.0	0.0	0.0			
50	0.197	0.0	0.0	0.0	0.0	0.0	0.0			
51	0.192	0.0	0.0	0.0	0.0	0.0	0.0			
52	0.186	0.0	0.0	0.0	0.0	0.0	0.0			
53	0.181	0.0	0.0	0.0	0.0	0.0	0.0			
54	0.175	0.0	0.0	0.0	0.0	0.0	0.0			
55	0.170	0.0	0.0	0.0	0.0	0.0	0.0			
56	0.165	0.0	0.0	0.0	0.0	0.0	0.0			
57	0.160	0.0	0.0	0.0	0.0	0.0	0.0			
58	0.156	0.0	0.0	0.0	0.0	0.0	0.0			
59	0.151	0.0	0.0	0.0	0.0	0.0	0.0			
60	0.147	0.0	0.0	0.0	0.0	0.0	0.0			
61	0.143	0.0	0.0	0.0	0.0	0.0	0.0			
62	0.138	0.0	0.0	0.0	0.0	0.0	0.0			
63	0.134	0.0	0.0	0.0	0.0	0.0	0.0			
64	0.130	0.0	0.0	0.0	0.0	0.0	0.0			
65	0.127	0.0	0.0	0.0	0.0	0.0	0.0			
66	0.123	0.0	0.0	0.0	0.0	0.0	0.0			
67	0.119	0.0	0.0	0.0	0.0	0.0	0.0			
68	0.116	0.0	0.0	0.0	0.0	0.0	0.0			
69	0.112	0.0	0.0	0.0	0.0	0.0	0.0			
70	0.109	0.0	0.0	0.0	0.0	0.0	0.0			
71	0.106	0.0	0.0	0.0	0.0	0.0	0.0			
72	0.103	0.0	0.0	0.0	0.0	0.0	0.0			
73	0.100	0.0	0.0	0.0	0.0	0.0	0.0			
74	0.097	0.0	0.0	0.0	0.0	0.0	0.0			
75	0.094	0.0	0.0	0.0	0.0	0.0	0.0			
76	0.092	0.0	0.0	0.0	0.0	0.0	0.0			
77	0.090	0.0	0.0	0.0	0.0	0.0	0.0			
78	0.087	0.0	0.0	0.0	0.0	0.0	0.0			
79	0.085	0.0	0.0	0.0	0.0	0.0	0.0			
80	0.083	0.0	0.0	0.0	0.0	0.0	0.0			
81	0.081	0.0	0.0	0.0	0.0	0.0	0.0			
82	0.079	0.0	0.0	0.0	0.0	0.0	0.0			
83	0.077	0.0	0.0	0.0	0.0	0.0	0.0			
84	0.075	0.0	0.0	0.0	0.0	0.0	0.0			
85	0.074	0.0	0.0	0.0	0.0	0.0	0.0			
86	0.072	0.0	0.0	0.0	0.0	0.0	0.0			
87	0.070	0.0	0.0	0.0	0.0	0.0	0.0			
88	0.068	0.0	0.0	0.0	0.0	0.0	0.0			
89	0.067	0.0	0.0	0.0	0.0	0.0	0.0			
90	0.065	0.0	0.0	0.0	0.0	0.0	0.0			
91	0.063	0.0	0.0	0.0	0.0	0.0	0.0			
92	0.062	0.0	0.0	0.0	0.0	0.0	0.0			
93	0.060	0.0	0.0	0.0	0.0	0.0	0.0			
94	0.059	0.0	0.0	0.0	0.0	0.0	0.0			
95	0.057	0.0	0.0	0.0	0.0	0.0	0.0			
96	0.056	0.0	0.0	0.0	0.0	0.0	0.0			
97	0.055	0.0	0.0	0.0	0.0	0.0	0.0			
98	0.053	0.0	0.0	0.0	0.0	0.0	0.0			
99	0.052	0.0	0.0	0.0	0.0	0.0	0.0			

Year	Initial discount rate 3.5% 29.813					Total PVC (£k): 2305				
	TOTALS:					TOTALS:				
	Cash sum	Capital	Maint.	Other	Negative costs	Cash	PV			
0	1.000	1991.7	0.0	0.0	0.0	1991.7	1991.7			
1	0.966	6.3	0.0	0.0	0.0	6.3	6.1			
2	0.934	6.3	0.0	0.0	0.0	6.3	5.9			
3	0.902	6.3	0.0	0.0	0.0	6.3	5.7			
4	0.871	6.3	0.0	0.0	0.0	6.3	5.5			
5	0.842	6.3	0.0	0.0	0.0	6.3	5.3			
6	0.814	6.3	0.0	0.0	0.0	6.3	5.2			
7	0.786	6.3	0.0	0.0	0.0	6.3	5.0			
8	0.759	6.3	0.0	0.0	0.0	6.3	4.8			
9	0.734	6.3	0.0	0.0	0.0	6.3	4.7			
10	0.709	6.3	0.0	0.0	0.0	6.3	4.5			
11	0.685	6.3	0.0	0.0	0.0	6.3	4.3			
12	0.662	6.3	0.0	0.0	0.0	6.3	4.2			
13	0.639	6.3	0.0							

## G Resilience Event Tree Analysis