

**APPENDIX J**

NFM assessment results

Table J.1: Local Scale Assessment results

No.	Area of Interest	Category (Source Control, Runoff Management, River Restoration)	Measure	Specific Locations	Criteria 1	Criteria 1 Weighting	Criteria 2	Criteria 2 Weighting	Initial Overall Weighting	Comments	Final Weighting (Scaled [0,1])
1	Nith U-S of Hall Bridge	River Restoration/Floodplain Reconnection	Set-Back Embankments	Confluence of Afton Water with Nith to Duncansburn Bridge.	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0
			Embankment Removal		1.2 Qp reduction of between 5 and 15% at the reach level	0.7	3.4 None	0	0.7		0.7
1.2		Source Control	Reducing Grazing Pressure on heavily grazed land	Heavily grazed land in upper catchment - East and West slopes of Afton Water catchment.	1.5 LCM data indicates improved grassland	0.5	3.4 None	0	0.5		0.5
1.3			Changing agricultural field drainage		1.5 LCM data indicates improved grassland	0.5	3.4 None	0	0.5		0.5
1.4			Upland drain blocking		2.1 LCM data indicates bog/coniferous forestry	0.5	3.4 None	0	0.5		0.5
1.5		Runoff Management	Floodplain/Riparian Afforestation	Areas immediately adjacent to the main channel between Afton Water and Duncansburn Bridge.	2.3 LCM data indicates no woodland in floodplain	0.5	3.4 None	0	0.5	Verified as part of field survey	0.5
2	Nith Between Drumlanrig and Hall Bridge	River Restoration/Floodplain Reconnection	Set-Back Embankments	Small reach to the West of Kirkconnel	3.4 None	0	3.4 None	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.1			Embankment Removal		3.4 None	0	3.4 None	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.2			Set-Back Embankments	Two Small Reaches to the South of Sanquhar	3.4 None	0	3.4 None	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.3			Embankment Removal		3.4 None	0	3.4 None	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.4		Source Control	Reducing Grazing Pressure on heavily grazed land	Slopes either side of the Mennock Water leading up to Wanlockhead	3.1 LCM data indicates arable land/pasture	0.5	3.4 None	0	0.5		0.5
2.6			Gully Woodland Planting		2.5 Extensive areas of slope >15 degrees	0.5	3.4 None	0	0.5		0.5
		Runoff Management	Creation of Tree Shelter Belts		2.5 Extensive areas of slope >15 degrees	0.5	3.4 None	0	0.5		0.5
		Source Control	Drain Blocking/Wetland Restoration	Headwaters of Euchar Water and Kello Water	2.1 LCM data indicates bog/coniferous forestry	0.5	3.4 None	0	0.5		0.5
3	Nith Between Drumlanrig and Friars Carse	River Restoration/Floodplain Reconnection	Set-Back Embankments	Main stem of Nith past Thornhill	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0
3.1			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0
3.2			Set-Back Embankments	Cample Water	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0
3.3			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0
3.4			Set-Back Embankments	Scar Water	1.1 Qp reduction of less than	0	3.4 None	0	0		0

No.	Area of Interest	Category (Source Control, Runoff Management, River Restoration)	Measure	Specific Locations	Criteria 1	Criteria 1 Weighting	Criteria 2	Criteria 2 Weighting	Initial Overall Weighting	Comments	Final Weighting (Scaled [0,1])	
					5 % at the reach level							
3.5			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0	
3.6			Set-Back Embankments	Pennyland Burn	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0	
3.7			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0	
3.8		Runoff Control	Changing agricultural field drainage	Farmland around Main Stem of Nith, Thornhill to Friars Carse	1.9 LCM data indicates arable land	0.5	3.4 None	0	0.5		0.5	
4	Nith D-S of Friars Carse	River Restoration/Floodplain Reconnection	Set-Back Embankments	Upper Cairn Water	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0	
4.1			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0	
4.2			Set-Back Embankments	Main Stem of Nith from Friars Carse to Dumfries/Whitesands	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0	
4.3			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0	
4.4			Set-Back Embankments	Lower Cairn Water	1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0		0	
4.5			Embankment Removal		1.1 Qp reduction of less than 5 % at the reach level	0	3.4 None	0	0	Note model shows significant increase in flows. Indicates that embankments previously may have prevented floodplain flow back into the channel - without embankments this is no longer an issue.	0	
4.6			Runoff Management	Changing agricultural field drainage	Farmland adjacent to main stem of Nith and throughout Cluden Water catchment	1.9 LCM data indicates arable land	0.5	3.4 None	0	0.5		0.5
4.7				Reducing soil compaction in arable areas, improving soil texture, reducing bare earth in wetter seasons		3.1 LCM data indicates arable land/pasture	0.5	3.4 None	0	0.5		0.5

Table J.2 Catchment Scale Assessment Results

River Nith restoration, cbec UK Ltd, October 2013

No.	Area of Interest	Category (Source Control, Runoff Management, River Restoration)	Measure	Specific Locations	Criteria 1	Criteria 1 Weighting	Criteria 2	Criteria 2 Weighting	Initial Overall Weighting	Comments	Final Weighting (Scaled [0,1])
1	Nith U-S of Hall Bridge	River Restoration/Floodplain Reconnection	Set-Back Embankments	Confluence of Afton Water with Nith to Duncansburn Bridge.	1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Set back embankments appear to result in simply increasing channel conveyance - modelling indicates an increase in peak flow over the baseline.	0
1.1			Embankment Removal		1.2 Qp reduction of between 5 and 15% at Kirkconnel PVA	0.7	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0.7	Results dependent upon assumptions in routing, although there are few large inflows between Hall's Bridge and Kirkconnel. Modelling indicates that while some inflows provide additional water, attenuation between measures and Kirkconnel is enough to maintain the drop in Qp. Significant inflows between the locations of the measure and Dumfries indicates limited extent of influence of measure.	0.7
1.2		Source Control	Reducing Grazing Pressure on heavily grazed land	Heavily grazed land in upper catchment - East and West slopes of Afton Water catchment.	1.7 QMEDsubcatchment/QMEDPVA	0.28	3.5 None	0	0.28		0.28
1.3			Changing agricultural field drainage		1.7 QMEDsubcatchment/QMEDPVA	0.28	3.5 None	0	0.28		0.28
1.4			Upland drain blocking		1.7 QMEDsubcatchment/QMEDPVA	0.1	3.5 None	0	0.1		0.1
1.5		Runoff Management	Floodplain/Riparian Afforestation	Areas immediately adjacent to the main channel between Afton Water and Duncansburn Bridge.	1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Verified as part of field survey	0
2	Nith Between Drumlanrig and Hall Bridge	River Restoration/Floodplain Reconnection	Set-Back Embankments	Small reach to the West of Kirkconnel	1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.1			Embankment Removal		1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.2			Set-Back Embankments	Two Small Reaches to the South of Sanquhar	1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.3			Embankment Removal		1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0
2.4		Source Control	Reducing Grazing Pressure on heavily grazed land	Slopes either side of the Mennock Water leading up to Wanlockhead	1.7 QMEDsubcatchment/QMEDPVA	0.05	3.5 None	0	0.05		0.05
2.6			Gully Woodland Planting		1.7 QMEDsubcatchment/QMEDPVA	0.05	3.5 None	0	0.05		0.05
		Runoff Management	Creation of Tree Shelter Belts		1.7 QMEDsubcatchment/QMEDPVA	0.05	3.5 None	0	0.05		0.05
		Source Control	Drain Blocking/Wetland Restoration	Headwaters of Euchan Water and Kello Water	1.7 QMEDsubcatchment/QMEDPVA	0.33	3.5 None	0	0.33		0.33
3	Nith Between Drumlanrig and Friars Carse	River Restoration/Floodplain Reconnection	Set-Back Embankments	Main stem of Nith past Thornhill	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0		0
3.1			Embankment Removal		1.5 Qp reduction of between 5 and 15% at Dumfries PVA	0.7	3.5 None	0	0.7		0.7

No.	Area of Interest	Category (Source Control, Runoff Management, River Restoration)	Measure	Specific Locations	Criteria 1	Criteria 1 Weighting	Criteria 2	Criteria 2 Weighting	Initial Overall Weighting	Comments	Final Weighting (Scaled [0,1])	
3.2			Set-Back Embankments	Cample Water	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0	Difficult to assess independently - Main Nith needs to be considered, hence assessed as single model.	0	
3.3			Embankment Removal		1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0	Difficult to assess independently - Main Nith needs to be considered, hence assessed as single model.	0	
3.4			Set-Back Embankments	Scar Water	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0	Difficult to assess independently - Main Nith needs to be considered, hence assessed as single model.	0	
3.5			Embankment Removal		1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	3.5 None	0	0	Difficult to assess independently - Main Nith needs to be considered, hence assessed as single model.	0	
3.6			Set-Back Embankments	Pennyland Burn	1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0	
3.7			Embankment Removal		1.1 Qp reduction of less than 5 % at Kirkconnel PVA	0	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	0	Not quantified - reach considered too small to have significant NFM benefit. Lower priority	0	
3.8			Runoff Control	Changing agricultural field drainage	Farmland around Main Stem of Nith, Thornhill to Friars Carse	1.7 QMEDsubcatchment/QMEDPVA	0.01	3.5 None	0	0.01	Note QMED ratio is for a typical sub-catchment - there are no significant tributaries in this area (after Scar/Cample water join)	0.01
4		Nith D-S of Friars Carse	River Restoration/Floodplain Reconnection	Set-Back Embankments	Upper Cairn Water	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0		0
4.1	Embankment Removal			1.2 Qp reduction of between 5 and 15% at Kirkconnel PVA		0.7	3.5 None	0	0.7		0.7	
4.2	Set-Back Embankments			Main Stem of Nith from Friars Carse to Dumfries/Whitesands	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0	Note not considered due to discussions with Dumfries Council indicating potential synchronisation effect	0	
4.3	Embankment Removal				1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0	Note not considered due to discussions with Dumfries Council indicating potential synchronisation effect	0	
4.4	Set-Back Embankments			Lower Cairn Water	1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0		0	
4.5	Embankment Removal				1.4 Qp reduction of less than 5 % at Dumfries PVA	0	3.5 None	0	0	Note that hydraulic model terminates within PVA and hence output for this section is used to directly inform catchment level assessment	0	
4.6	Runoff Management			Changing agricultural field drainage	Farmland adjacent to main stem of Nith and throughout Cluden Water catchment	1.7 QMEDsubcatchment/QMEDPVA	0.23	3.5 None	0	0.23		0.23
4.7	Reducing soil compaction in arable areas, improving soil texture, reducing bare earth in wetter seasons			1.7 QMEDsubcatchment/QMEDPVA		0.23	3.5 None	0	0.23		0.23	

Table J3-Overall NFM Prioritisation

No.	Measure	Specific Locations	Local Benefit	Catchment Benefit	Overall Score	Commentary
1.1	Embankment Removal	Confluence of Afton Water with Nith to Duncansburn Bridge.	0.7	0.7	0.7	<p>This reach has high flood plain storage potential (see S20) and potential low surface roughness. However the 2D hydraulics indicates that at the local scale setting back embankments leads to no significant benefit while the removal of embankments lead to a small reduction in Qp. The impact at Kirkconnel PVA is not significant.</p> <p>At the catchment scale the results are dependent upon assumptions in routing, although there are few large inflows between Hall's Bridge and Kirkconnel. Modelling indicates that while some inflows provide additional water, attenuation between measures and Kirkconnel is enough to maintain the drop in Qp. However, significant inflows between measures and Dumfries mean that the effect is limited at the Dumfries PVA.</p>
2.8	Drain Blocking/Wetland Restoration	Headwaters of Euchan Water and Kello Water	0.5	0.33	0.415	<p>There are substantial areas of coniferous woodland and upland bog in the headwaters of Euchan Water and Kello Water. The catchment makes a medium contribution to the catchment median flow so there is medium potential for measures such as drain blocking</p>
1.2	Reducing Grazing Pressure on heavily grazed land	Heavily grazed land in upper catchment - East and West slopes of Afton Water catchment.	0.5	0.28	0.39	<p>There are large areas of improved grassland in these sub-catchments with field evidence of heavy grazing pressures. In addition the sub-catchment contributes substantially to the median flow at the local and catchment scale. There is therefore a high potential for source control measures to be effective (land management, afforestation, wetland creation, etc.)</p>
1.3	Changing agricultural field drainage	Heavily grazed land in upper catchment - East and West slopes of Afton Water catchment.	0.5	0.28	0.39	<p>There are large areas of improved grassland in these sub-catchments with field evidence of heavy grazing pressures. In addition the sub-catchment contributes substantial to the median flow at the local and catchment scale. There is therefore a high potential for source control measures to be effective (land management, afforestation, wetland creation, etc.)</p>
4.6	Changing agricultural field drainage	Farmland adjacent to main stem of Nith and throughout Cluden Water catchment	0.5	0.23	0.365	<p>Catchments feeding the main stem of Nith and throughout Cluden Water widely used for agriculture in the upper reaches and flood plain with urban development prevalent in the lower reaches. There are limited opportunities for source control or runoff reduction however, the sub-catchments have a significant impact on the median flow at the Dumfries PVA so any measures would lead to direct benefits. Further investigation would be required into the presence and nature of drains before a positive benefit can be confirmed.</p>

4.7	Reducing soil compaction in arable areas, improving soil texture, reducing bare earth in wetter seasons	Farmland adjacent to main stem of Nith and throughout Cluden Water catchment	0.5	0.23	0.365	Catchments feeding the main stem of Nith and throughout Cluden Water widely used for agriculture in the upper reaches and flood plain with urban development prevalent in the lower reaches. There are limited opportunities for source control or runoff reduction however, the sub-catchments have a significant impact on the median flow at the Dumfries PVA so any measures would lead to direct benefits. Further investigation would be required into the presence and nature of drains before a positive benefit can be confirmed.
1.4	Upland drain blocking	Areas of commercial forestry south of the B741, drained peatland in upper catchment.	0.5	0.1	0.3	Areas of commercial forestry south of the B741 together with the presence of confined and unconfined peatland in upper catchment (Waterhead catchment). Typically artificial drainage is used in these areas and as such there is potential to consider drain blocking. In addition the sub-catchment is a high contributor to the median flow at the local and catchment scale.
2.4	Reducing Grazing Pressure on heavily grazed land	Slopes either side of the Mennock Water leading up to Wanlockhead	0.5	0.05	0.275	This reach and sub-catchments have a high degree of arable land/pasture and evidence of grazing pressures. In addition the catchment has a medium impact on the catchment scale median flow. Therefore there is medium potential for source control measures to be effective.
2.6	Gully Woodland Planting	Slopes either side of the Mennock Water leading up to Wanlockhead	0.5	0.05	0.275	This reach and sub-catchments have a high degree of arable land/pasture and evidence of grazing pressures. In addition upland areas have steep slopes (>15%). There is therefore potential for measures such as gully planting and the use of tree shelter belts. The catchment has a medium impact on the catchment scale median flow. Therefore there is medium potential for source control measures such as gully afforestation and shelter belts to be effective.
2.68	Creation of Tree Shelter Belts	Slopes either side of the Mennock Water leading up to Wanlockhead	0.5	0.05	0.275	This reach and sub-catchments have a high degree of arable land/pasture and evidence of grazing pressures. In addition upland areas have steep slopes (>15%). There is therefore potential for measures such as gully planting and the use of tree shelter belts. The catchment has a medium impact on the catchment scale median flow. Therefore there is medium potential for source control measures such as gully afforestation and shelter belts to be effective.
3.8	Changing agricultural field drainage	Farmland around Main Stem of Nith, Thornhill to Friars Carse	0.5	0.01	0.255	There is some potential to modify agricultural practice along the main stem of Nith between Thornhill and Friars Carse. However, the impact on the catchment scale peak discharge would be low and any flood plain connectivity would lead to negative impact.

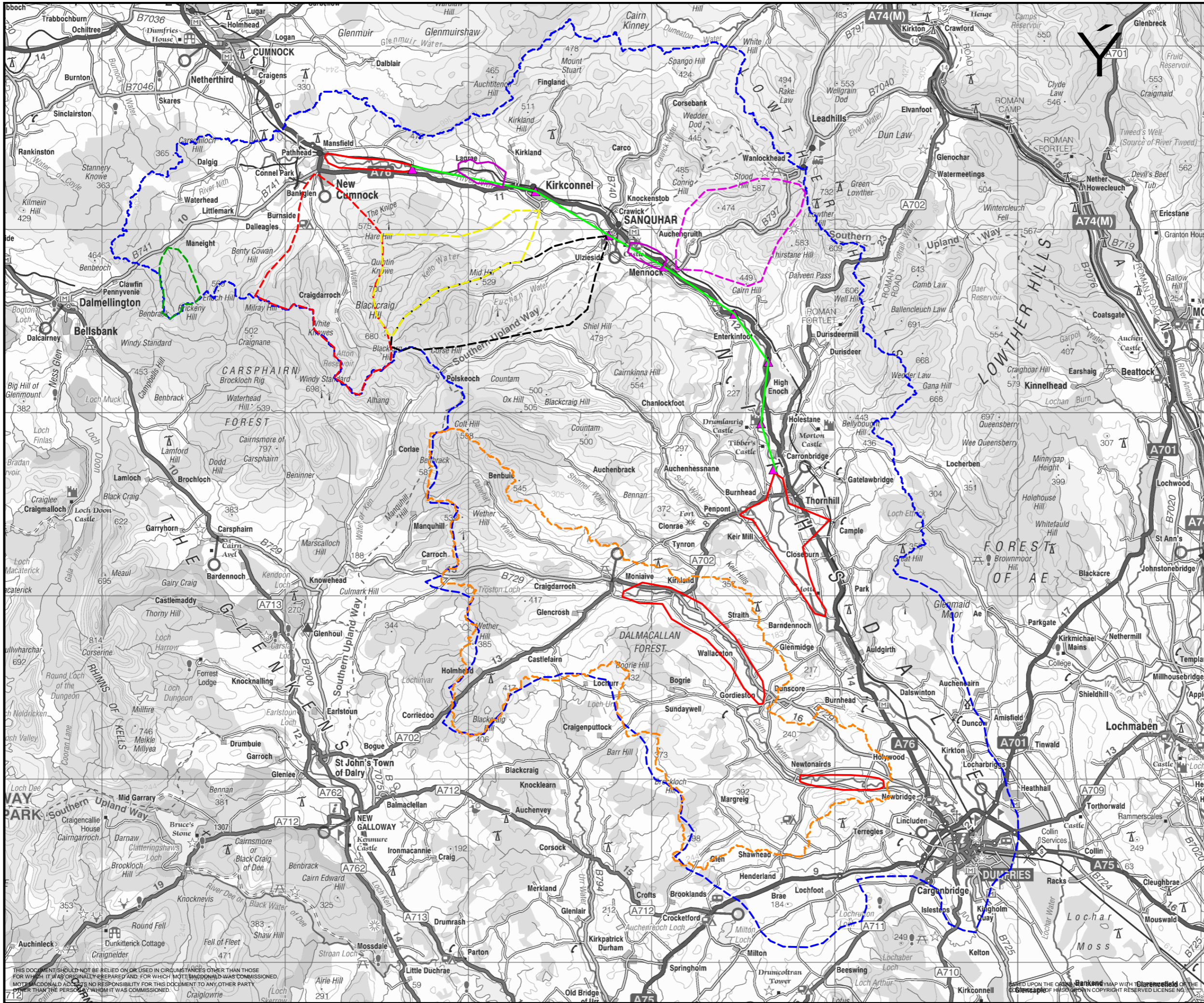
1.5	Floodplain/Riparian Afforestation	Areas immediately adjacent to the main channel between Afton Water and Duncansburn Bridge.	0.5	0	0.25	The high S20 ISP score, the low flood plain roughness (improved grassland) and the importance of the flood plain all indicate a high potential for increasing flood plain roughness through afforestation or set aside type measures. Due to the low contribution to Qmed at the catchment scale the local benefits would not be detectable at Dumfries.
1	Set-Back Embankments	Confluence of Afton Water with Nith to Duncansburn Bridge.	0	0	0	This reach has high flood plain storage potential (see S20) and potential low surface roughness. However the 2D hydraulics indicates that at the local scale setting back embankments leads to no significant benefit while the removal of embankments lead to a small reduction in Qp. The impact at Kirkconnel PVA is not significant.  At the catchment scale the results are dependent upon assumptions in routing, although there are few large inflows between Hall's Bridge and Kirkconnel. Modelling indicates that while some inflows provide additional water, attenuation between measures and Kirkconnel is enough to maintain the drop in Qp. However, significant inflows between measures and Dumfries mean that the effect is limited at the Dumfries PVA.
2	Set-Back Embankments	Small reach to the West of Kirkconnel	0	0	0	The reach has low flood plain storage potential as indicated by S20 and field evidence. It has not been modelled in detail. The impact of embankment removal would be low and not significant at local or catchment scales. Further small scale work would be required with very detailed 2D modelling to ascertain the catchment scale impact.
2.1	Embankment Removal	Small reach to the West of Kirkconnel	0	0	0	The reach has low flood plain storage potential as indicated by S20 and field evidence. It has not been modelled in detail. The impact of embankment removal would be low and not significant at local or catchment scales. Further small scale work would be required with very detailed 2D modelling to ascertain the catchment scale impact.
2.2	Set-Back Embankments	Two Small Reaches to the South of Sanquhar	0	0	0	The scale of these reaches is such that they have not been hydraulically modelled and embankment works would not give significant benefits at the catchment scale.
2.3	Embankment Removal	Two Small Reaches to the South of Sanquhar	0	0	0	The scale of these reaches is such that they have not been hydraulically modelled and embankment works would not give significant benefits at the catchment scale.
3	Set-Back Embankments	Main stem of Nith past Thornhill	0	0	0	The S20 screening generally shows low potential for flood plain storage in this reach. The modelling shows that the removal of embankments in this reach would lead to the more rapid return of flood plain water to the main channel leading to an increase the peak flow. There would therefore be a negative effect of reconnecting all or part of the floodplain.
3.1	Embankment Removal	Main stem of Nith past Thornhill	0	0	0	The S20 screening generally shows low potential for flood plain storage in this reach. The modelling shows that the removal of embankments in this reach would lead to the more rapid return of flood plain water to the main channel leading to an increase the peak flow. There would therefore be a negative effect



						of reconnecting all or part of the floodplain.
3.2	Set-Back Embankments	Cample Water	0	0	0	The S20 screening generally shows low potential for flood plain storage in this reach. The modelling shows that the removal of embankments in this reach would lead to the more rapid return of flood plain water to the main channel leading to an increase the peak flow. There would therefore be a negative effect of reconnecting all or part of the floodplain.
3.3	Embankment Removal	Cample Water	0	0	0	The S20 screening generally shows low potential for flood plain storage in this reach. The modelling shows that the removal of embankments in this reach would lead to the more rapid return of flood plain water to the main channel leading to an increase the peak flow. There would therefore be a negative effect of reconnecting all or part of the floodplain.
3.4	Set-Back Embankments	Scar Water	0	0	0	The floodplain is relatively limited in extent and has medium to low storage potential (S20 and field evidence). Modelling shows an insignificant effect of embankment removal or changes in characteristics.
3.5	Embankment Removal	Scar Water	0	k	0	The floodplain is relatively limited in extent and has medium to low storage potential (S20 and field evidence). Modelling shows an insignificant effect of embankment removal or changes in characteristics.
3.6	Set-Back Embankments	Pennyland Burn	0	0	0	The floodplain is relatively limited in extent and has medium to low storage potential (S20 and field evidence). The catchment is small and the contribution to the catchment scale median flow is low. The overall effect on flood risk is low.]
3.7	Embankment Removal	Pennyland Burn	0	0	0	The floodplain is relatively limited in extent and has medium to low storage potential (S20 and field evidence). The catchment is small and the contribution to the catchment scale median flow is low. The overall effect on flood risk is low.]
4	Set-Back Embankments	Upper Cairn Water	0	0	0	The floodplain storage in the upper Cairn Water is low and the impact on the peak flow not significant. Embankment removal or set back would not be an effective means of reducing peak flows.

4.1	Embankment Removal	Upper Cairn Water	0	0	0	The floodplain storage in the upper Cairn Water is low and the impact on the peak flow not significant. Embankment removal or set back would not be an effective means of reducing peak flows.
4.2	Set-Back Embankments	Main Stem of Nith from Friars Carse to Dumfries/Whitesands	0	-1	-0.5	The S20 mapping indicates a high flood plain storage potential within this reach and field data indicates that the river has been largely embanked. However, modelling indicates that their removal or set-back will lead to negative effects on peak flows in the Dumfries PVA. This was confirmed by the FRA carried out by Dumfries and Galloway Council who are concerned about any measures to modify upstream embankments.
4.3	Embankment Removal	Main Stem of Nith from Friars Carse to Dumfries/Whitesands	0	-1	-0.5	The S20 mapping indicates a high flood plain storage potential within this reach and field data indicates that the river has been largely embanked. However, modelling indicates that their removal or set-back will lead to negative effects on peak flows in the Dumfries PVA. This was confirmed by the FRA carried out by Dumfries and Galloway Council who are concerned about any measures to modify upstream embankments.
4.4	Set-Back Embankments	Lower Cairn Water/Cluden	0	-1	-0.5	This is another reach where S20 results and field information indicates embankments and the potential for flood plain storage. However, as for other lower reaches the impact would be negative due to the more rapid return of stored water to the main channel leading to increased flood risk at the downstream PVA.
4.5	Embankment Removal	Lower Cairn Water/Cluden	0	-1	-0.5	This is another reach where S20 results and field information indicates embankments and the potential for flood plain storage. However, as for other lower reaches the impact would be negative due to the more rapid return of stored water to the main channel leading to increased flood risk at the downstream PVA.





Notes

- Menock Water
- Kello
- Euchan
- Cluden Water
- Waterhead -Upper Catchment
- Afton Water
- Routing Schematic
- Catchment Boundary
- Model Domain
- Channel Potential -Not Modelled

Client  
**SEPA**

Title  
**NFM Assessment Areas**

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Broomielaw  
Glasgow  
G2 8JB  
United Kingdom  
Tel +44 (0)141 222 4500  
Fax +44 (0)141 221 2048  
Web www.mottmac.com

Designed	JL	Eng. Chk.	N/A	
Drawn	JL	Coordination	N/A	
Drp. Chk.	TJ	Approved	TJ	
Scale at A3	1:179,100	Project	318688	Status
		Mapinfo file	NFM_ID_AREAS	DR
Drawing Number	318688			Rev
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