B.1 Hydrology Calculations

This section presents details on the hydrological flow estimation.

B.1.1 FSU Index Flood Estimation – 7 Variable Equation

ARUP

HEP BAL1

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_990_4

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	2.55	km^2	Catchment Area
BFIsoils	=	0.66		Base flow index derived from soils data
SAAR	=	1014	mm	Standard annual averagen rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.61		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	0.58	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**0.28**	m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	*(1+URBEXT)1.482*		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**0.45**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.00		
UAF	=	*(1+URBEXT)* $^{1.482}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed (urban, adjusted)	=	**0.45**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1902_4

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	37.57	km^2	Catchment Area
BFIsoils	=	0.66		Base flow index derived from soils data
SAAR	=	1161	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.95		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	11.60	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**8.42**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal S

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**13.55**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	**0.00**		
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	**1.00**		
Qmed (urban, adjusted)	=	**13.55**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1957_2

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	49.52	km^2	Catchment Area
BFIsoils	=	0.69		Base flow index derived from soils data
SAAR	=	1137	mm	Standard annual average rainfall (1961-1990)
FARL	=	0.98		Flood attenuation by reservoirs and lakes
DRAIND	=	0.83		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	11.19	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD) = **9.35** m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**15.05**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.001		
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.0009		
Qmed (urban, adjusted)	=	**15.06**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1957_5

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	52.43	km^2	Catchment Area
BFIsoils	=	0.69		Base flow index derived from soils data
SAAR	=	1132	mm	Standard annual average rainfall (1961-1990)
FARL	=	0.98		Flood attenuation by reservoirs and lakes
DRAIND	=	0.81		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	9.94	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**9.52**	m^3/s

4.0 Qmed Adjustment Factor (Pivotal Sit

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	*(1+URBEXT)1.482*		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**15.33**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	**0.02**		
UAF	=	*(1+URBEXT)* $^{1.482}$		*Urban adjustment factor*
UAF	=	**1.02**		
Qmed (urban, adjusted)	=	**15.71**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1462_5

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	8.25	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1103	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.55		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	26.22	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD) = **1.79** m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	*(1+URBEXT)1.4*		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**2.88**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.00		
UAF	=	*(1+URBEXT)* $^{1.48.}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed (urban, adjusted)	=	**2.88**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_965_4

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	12.72	km^2	Catchment Area
BFIsoils	=	0.67		Base flow index derived from soils data
SAAR	=	1171	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.94		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	17.37	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD) = **3.29** m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**5.29**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.00		
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed (urban, adjusted)	=	**5.29**	m^3/s	

ARUP

HEP HAG2

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1721_7

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	10.33	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1059	mm	Standard annual average rainfall (1961-1990)
FARL	=	0.92		Flood attenuation by reservoirs and lakes
DRAIND	=	0.49		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	1.67	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5}\ AREA^{0.937}\ BFIsoils^{-0.922}\ SAAR^{1.306}\ FARL^{2.217}\ DRAIND^{0.341}\ S1085^{0.185}\ (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**1.02**	m³/s	

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m³/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m³/s	Qmed at the pivotal siteestimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**1.64**	m³/s	

5.0 Adjustment for Urbanisation

Urban area	=		km²	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.00		
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed (urban, adjusted)	=	**1.64**	m³/s	

ARUP

HEP OAT1

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: Sink - Not indicated on FSU Web Portal (Manual)

2.0 Flood Studies Update Physical Catchment Descriptors

AREA	=	4.21	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1051	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.15		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	1.77	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**0.35**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal Sit

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48;}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**0.57**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.26		HEP OAT1
UAF	=	$(1+URBEXT)^{1.48;}$		*Urban adjustment factor*
UAF	=	**1.40**		
Qmed (urban, adjusted)	=	**0.80**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1959_2 - PCDs (incl. catchment area) corrected from FSU node

2.0 Flood Studies Update Physical Catchment Descriptor

AREA	=	10.33	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1047	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.21		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	1.77	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**0.908**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal S

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48.}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**1.46**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	**0.16**		
UAF	=	$(1+URBEXT)^{1.48.}$		*Urban adjustment factor*
UAF	=	**1.25**		
Qmed (urban, adjusted)	=	**1.83**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19020 - at Ballyedmont

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	73.9548	km^2	Catchment Area
BFIsoils	=	0.664		Base flow index derived from soils data
SAAR	=	1179.07	mm	Standard annual average rainfall (1961-1990)
FARL	=	1		Flood attenuation by reservoirs and lakes
DRAIND	=	0.989		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	11.0166	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD) = **16.22** m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**26.12**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	**0.00**		
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	**1.00**		
Qmed (urban, adjusted)	=	**26.12**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_712_6

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	77.09	km^2	Catchment Area
BFIsoils	=	0.67		Base flow index derived from soils data
SAAR	=	1177	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.95		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	10.40	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**16.34**	m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48;}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**26.31**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.00		
UAF	=	$(1+URBEXT)^{1.48;}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed (urban, adjusted)	=	**26.31**	m^3/s	

ARUP

HEP OW5

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_711_1

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	21.34	km^2	Catchment Area
BFIsoils	=	0.67		Base flow index derived from soils data
SAAR	=	1143	mm	Standard annual average rainfall (1961 - 1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.81		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	17.34	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.300} FARL^{2.211} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD) = **4.87** m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**7.84**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	**0.00**		
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	**1.00**		
Qmed (urban, adjusted)	=	**7.84**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1955_2

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	98.98	km^2	Catchment Area
BFIsoils	=	0.67		Base flow index derived from soils data
SAAR	=	1168	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.92		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	9.89	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**19.92**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48.}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**32.08**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.0003		
UAF	=	$(1+URBEXT)^{1.48.}$		*Urban adjustment factor*
UAF	=	1.0004		
Qmed (urban, adjusted)	=	**32.09**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1955_4

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	99.47	km^2	Catchment Area
BFIsoils	=	0.67		Base flow index derived from soils data
SAAR	=	1168	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.93		Drainage density, relates to the length stream network and catchment area NETLEN/AREA)
S1085	=	9.68	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**19.94**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal Sit

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.28		*SE(Qmed gauge) = (st.dev)/(Sqrt(N))*
Total adjustment factor		**1.61**		*(Qmed piv (gauged) + SE) / Qmed piv (PCD)*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**32.07**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.002		
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	1.003		
Qmed (urban, adjusted)	=	**32.17**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1955_6

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	105.10	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1163	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.89		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	8.88	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**20.20**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**32.52**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.006		
UAF	=	$(1+URBEXT)^{1.482}$		*Urban adjustment factor*
UAF	=	1.009		
Qmed (urban, adjusted)	=	**32.82**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1955_7

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	105.87	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1162	mm	Standard annual average rainfall (1961-1990)
FARL	=	1.00		Flood attenuation by reservoirs and lakes
DRAIND	=	0.89		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	8.90	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD)	=	**20.28**	m^3/s	

4.0 Qmed Adjustment Factor (Pivotal Site

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48.}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**32.66**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	**0.01**		
UAF	=	$(1+URBEXT)^{1.48.}$		*Urban adjustment factor*
UAF	=	**1.02**		
Qmed (urban, adjusted)	=	**33.20**	m^3/s	

ARUP

Job Title	Midleton FRS
Job Number	252803
Calculation	Flood Studies Update

1.0 Subcatchment: 19_1955_7 + 19_1957_6

2.0 Flood Studies Update Physical Catchment Descriptors:

AREA	=	158.51	km^2	Catchment Area
BFIsoils	=	0.68		Base flow index derived from soils data
SAAR	=	1147	mm	Standard annual average rainfall (1961-1990)
FARL	=	0.99		Flood attenuation by reservoirs and lakes
DRAIND	=	0.85		Drainage density, relates to the length stream network and catchment area (NETLEN/AREA)
S1085	=	9.39	m/km	Slope of the main channel between 10% and 85% of its length measured upstream from the HEP
ARTDRAIN2	=	0		Proportion of the river network that is included in arterial drainage schemes

3.0 Median Annual Flood (Rural)

Qmed (rural, PCD) $= 1.237 \times 10^{-5} AREA^{0.937} BFIsoils^{-0.922} SAAR^{1.306} FARL^{2.217} DRAIND^{0.341} S1085^{0.185} (1+ARTDRAIN2)^{0.408}$

Qmed (rural, PCD) = **28.22** m^3/s

4.0 Qmed Adjustment Factor (Pivotal Site)

Pivotal Site Name		Ballyedmond		
Pivotal Site Station Number		19020		
Qmed piv (gauged)	=	24.81	m^3/s	Qmed at the pivotal site from gauge records
Qmed piv (rural, PCD)	=	16.22	m^3/s	Qmed at the pivotal site estimated from PCD equation
URBEXT	=	0.00		From FSU Webportal
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.00		
Qmed piv (Urban, PCD)	=	16.22		
AdjFac	=	*Qmed piv (gauged)/Qmed piv (rural, PCD)*		
AdjFac	=	1.53		
Error of estimate for pivot st		1.05		*SE(Qmed gauge) = (0.36*Qmed piv(gauged)/(Sqrt(N))*
Total adjustment factor		**1.61**		*AdjFac*Error of estimate of pivot st*
Qmed (rural, adjusted)	=	*AdjFac x Qmed (rural, PCD) for subject site*		
Qmed (rural, adjusted)	=	**45.43**	m^3/s	

5.0 Adjustment for Urbanisation

Urban area	=		km^2	Urbanised area as per Corine landcover 2000 (optional)
URBEXT	=	0.02		
UAF	=	$(1+URBEXT)^{1.48}$		*Urban adjustment factor*
UAF	=	1.022		
Qmed (urban, adjusted)	=	**46.45**	m^3/s	