APPENDIX C

Hydrologic Parameter Sheets

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023-05-25
By: KS

D.A. NAME **PRE-1**
D.A. AREA (ha) **4.32**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-1
Pre-Dev to CP Trail (Outlet #1)

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	4.3
				0
				0
				0
Total Area				4.3

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0	98	0	98	0.00	0.00
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		0.00		4.3	74	4.32	319.68
0											0.00	0.00
0											0.00	0.00
0											0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		4.3			

Composite Area Calculations		
	Total Pervious Area	4.3
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	74.0
	Total Area Check	4.3

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Listowel Silt Loam		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0.000
Cultivated	7	4	30.24	0.35	4		0		0		0	1.512
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		4.32	7	Composite Runoff Coefficient								0.350

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	184.5	2	1.08%	2.7	0.28	0.18	0.12	0.12	0.15	0.10	0.54	0.36

Appropriate calculated time to	0.36	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023-05-25
By: KS

D.A. NAME **PRE-2**
D.A. AREA (ha) **13.33**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-2
Pre-Dev to North Tile Drain (Outlet #2)

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	13.3
				0
				0
				0
Total Area				13.3

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0.000	98	0	98	0.00	0.00
0	0	98	0	98	0	98	0	98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		0.00		13.3	74	13.33	986.42
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		13.3			

Composite Area Calculations		
	Total Pervious Area	13.3
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	74.0
	Total Area Check	13.3

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
				Listowel Silt Loam		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0.000
Cultivated	7	13	93.31	0.35	13		0		0		0	4.666
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		13.33	7	Composite Runoff Coefficient								0.350

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	552.64	6	1.09%	2.7	0.28	0.55	0.37	0.37	0.40	0.27	0.93	0.62

Appropriate calculated time to	0.62	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023-05-25
By: KS

D.A. NAME **PRE-3**
D.A. AREA (ha) **3.05**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-3
Pre-Dev to East Tile Drain (Outlet #3)

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	3.05
				0
				0
				0
Total Area				3.05

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0.000	98	0	98	0.00	0.00
0	0	98	0	98	0	98	0	98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		0.00		3.1	74	3.05	225.70
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		3.1			

Composite Area Calculations		
	Total Pervious Area	3.1
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	74.0
	Total Area Check	3.1

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
				Listowel Silt Loam		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0.000
Cultivated	7	3	21.35	0.35	3		0		0		0	1.068
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		3.05	7	Composite Runoff Coefficient								0.350

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	158.58	6.5	4.10%	2.7	0.55	0.08	0.05	0.05	0.10	0.07	0.32	0.22

Appropriate calculated time to	0.22	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023-05-25
By: KS

D.A. NAME **PRE-4**
D.A. AREA (ha) **2.29**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-4
Pre-Dev to Southeast Tile Drain (Outlet #4)

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	2.3
				0
				0
				0
Total Area				2.3

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0.000	98	0	98	0.00	0.00
0	0	98	0	98	0	98	0	98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		0.00		2.3	74	2.29	169.46
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		2.3			

Composite Area Calculations		
	Total Pervious Area	2.3
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	74.0
	Total Area Check	2.3

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
				Listowel Silt Loam		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0.000
Cultivated	7	2	16.03	0.35	2		0		0		0	0.802
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		2.29	7	Composite Runoff Coefficient								0.350

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	208.86	2	0.96%	2.7	0.26	0.22	0.15	0.15	0.18	0.12	0.60	0.40

Appropriate calculated time to	0.40	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023-05-25
By: KS

D.A. NAME **PRE-5**
D.A. AREA (ha) **3.00**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment PRE-5
Pre-Dev to South Residential

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	3.0
				0
				0
				0
Total Area				3.0

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0.000	98	0	98	0.00	0.00
0	0	98	0	98	0	98	0	98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		0.00		3.0	74	3.00	222.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		3.0			

Composite Area Calculations		
	Total Pervious Area	3.0
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	74.0
	Total Area Check	3.0

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
				Listowel Silt Loam		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0.000
Cultivated	7	3	21	0.35	3		0		0		0	1.050
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		3.00	7	Composite Runoff Coefficient								0.350

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	105.7	4.5	4.26%	2.7	0.56	0.05	0.04	0.04	0.07	0.05	0.26	0.17

Appropriate calculated time to	0.17	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023.05.18
By: KS

D.A. NAME **POST-1**
D.A. AREA (ha) **1.02**

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment POST-1

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	1.0
				0
				0
				0
Total Area				1.0

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0	98	0	98	0.00	0.00
0	0	98	0	98	0	98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		1.02	71	0.0	74	1.02	72.41
0											0.00	0.00
0											0.00	0.00
0											0.00	0.00
Subtotal Area	0.00		0.00		0.00		1.02		0.0			

Composite Area Calculations		
	Total Pervious Area	1.0
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	71.0
	Total Area Check	1.0

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
				Listowel Silt Loam		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	1.0198	5.099	0.15	1		0		0		0	0.153
Cultivated	7	0	0		0		0		0		0	0.000
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		1.02	5	Composite Runoff Coefficient								0.150

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	213	2.28	1.07%	2.7	0.28	0.21	0.14	0.14	0.20	0.13	0.74	0.49

Appropriate calculated time to	0.49	Appropriate Method:	Airport

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Expansion Lands	**D.A. NAME**	**POST-2**
Project No.:	1060-6220	**D.A. AREA (ha)**	**16.63**
Date:	2023.05.23		
By:	KS		

Post Development Drainage Area: Catchment POST-2

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100%	16.63
Total Area Check				16.63

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	4.64	98	0.05	98	0.000	98	6.749	98	0	98	11.44	1121.029
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	4.637		0.054		0.000		6.749		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0	60	0	66	0	50	5.191	71	0	74	5.190928	368.556
0											0	0
0											0	0
0											0	0
Subtotal Area	0		0		0		5.191		0			

Pervious Area Calculations	Total Pervious Area	5.19	
	Composite Pervious Curve Number	71	
Impervious Area Calculations	Total Directly Connected Area	10.055	
	Total Indirectly Connected Area	1.384	
	Total Impervious Area	11.44	
	% X imp	60.5	
	% T imp	68.8	
	Total Area Check	16.63	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	5.19	25.95
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	333	0.013

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Expansion Lands	**D.A. NAME**	**POST-3**
Project No.:	1060-6220	**D.A. AREA (ha)**	**0.71**
Date:	2023.05.18		
By:	KS		

Post Development Drainage Area: Catchment POST-3

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100%	0.71
				0
				0
				0
Total Area Check				0.71

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0.11	98	0.17	98	0.000	98	0.273	98		98	0.55	54.255
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0.112		0.169		0.000		0.273		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0	60	0	66	0	50	0.156	71	0	74	0.15648	11.110
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		0.156		0			

Pervious Area Calculations	Total Pervious Area	0.16	
	Composite Pervious Curve Number	71	
Impervious Area Calculations	Total Directly Connected Area	0.505	
	Total Indirectly Connected Area	0.048	
	Total Impervious Area	0.55	
	% X imp	71.2	
	% T imp	78.0	
	Total Area Check	0.71	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.16	0.78
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	69	0.013

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Glenelg Expansion Lands
Project Number: 1060-6220
Date: 2023.05.18
By: KS

D.A. NAME **POST-4**
D.A. AREA (ha) **0.49**

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment POST-4

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100.0%	0.5
				0
				0
				0
Total Area				0.5

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0	98	0	98	0	98	0	98	0	98	0.00	0.00
0	0	98	0	98	0	98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0		0		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
LTW	0.00		0.00		0.00		0.49	71	0.0	74	0.49	35.08
0											0.00	0.00
0											0.00	0.00
0											0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.49		0.0			

Composite Area Calculations		
	Total Pervious Area	0.5
	Total Impervious Area	0.0
	% Impervious	0.0%
	Composite Curve Number	71.0
	Total Area Check	0.5

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
				Listowel Silt Loam		0		0		0		
Landuse	IA (mm)	Area (ha)	A * IA	RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.00	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0.4941	2.4705	0.15	0		0		0		0	0.074
Cultivated	7	0	0	0.35	0		0		0		0	0.000
Impervious	2	0	0		0		0		0		0	0.000
Composite IA		0.49	5	Composite Runoff Coefficient								0.150

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Overland	28	0.56	2.00%	2.7	0.38	0.02	0.01	0.01	0.02	0.02	0.22	0.15

Appropriate calculated time to	0.15	Appropriate Method:	Airport

Minimum Tp of 0.2hr used

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Expansion Lands	**D.A. NAME**	**POST-5**
Project No.:	1060-6220	**D.A. AREA (ha)**	**1.76**
Date:	2023.05.18		
By:	KS		

Post Development Drainage Area: Catchment POST-5

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100%	1.76
Total Area Check				1.76

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		Paved Park		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0.00	98	0.10	98	0.00	98	0.160	98	0.19	98	0.45	43.855
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0.000		0.095		0.000		0.160		0.192346			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0	60	0	66	0	50	1.313	71	0	74	1.312504	93.188
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		1.313		0			

Pervious Area Calculations	Total Pervious Area	1.31
	Composite Pervious Curve Number	71
Impervious Area Calculations	Total Directly Connected Area	0.418
	Total Indirectly Connected Area	0.029
	Total Impervious Area	0.45
	% X imp	23.8
	% T imp	25.4
	Total Area Check	1.76

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.31	6.56
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	108	0.013

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Expansion Lands	**D.A. NAME**	**POST-6**
Project No.:	1060-6220	**D.A. AREA (ha)**	**0.45**
Date:	2023.05.18		
By:	KS		

Post Development Drainage Area: Catchment POST-6

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100%	0.45
				0
				0
				0
Total Area Check				0.45

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0.02	98	0.06	98	0.000	98	0.205	98		98	0.28	27.234
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0.018		0.055		0.000		0.205		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0	60	0	66	0	50	0.172	71	0	74	0.1721	12.219
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		0.172		0			

Pervious Area Calculations	Total Pervious Area	0.17
	Composite Pervious Curve Number	71
Impervious Area Calculations	Total Directly Connected Area	0.241
	Total Indirectly Connected Area	0.037
	Total Impervious Area	0.28
	% X imp	53.5
	% T imp	61.8
	Total Area Check	0.45

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.17	0.86
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	55	0.013

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Expansion Lands	**D.A. NAME**	**POST-7**
Project No.:	1060-6220	**D.A. AREA (ha)**	**3.35**
Date:	2023.05.18		
By:	KS		

Post Development Drainage Area: Catchment POST-7

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100%	3.35
Total Area Check				3.35

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		Paved Park		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0.00	98	0.00	98	0.00	98	1.844	98	0.00	98	1.84	180.673
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0.000		0.000		0.000		1.844		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0	60	0	66	0	50	1.508	71	0	74	1.5084	107.096
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		1.508		0			

Pervious Area Calculations	Total Pervious Area	1.51
	Composite Pervious Curve Number	71
Impervious Area Calculations	Total Directly Connected Area	1.844
	Total Indirectly Connected Area	0.000
	Total Impervious Area	1.84
	% X imp	55.0
	% T imp	55.0
	Total Area Check	3.35

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.51	7.54
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	149	0.013

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Expansion Lands	**D.A. NAME**	**SWMF**
Project No.:	1060-6220	**D.A. AREA (ha)**	**1.56**
Date:	2023.05.18		
By:	KS		

Post Development Drainage Area: Catchment SWMF

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic	% Area	Area
Listowel Silt Loam	LTW	B	100%	1.56
				0
				0
				0
Total Area Check				1.56

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0.00	98	0.00	98	0.000	98	0.000	98	0.7805	98	0.78	76.489
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0.000		0.000		0.000		0.000		0.7805			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
LTW	0	60	0	66	0	50	0.781	71	0	74	0.7805	55.416
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		0.781		0			

Pervious Area Calculations	Total Pervious Area	0.78	
	Composite Pervious Curve Number	71	
Impervious Area Calculations	Total Directly Connected Area	0.390	
	Total Indirectly Connected Area	0.390	
	Total Impervious Area	0.78	
	% X imp	50.0	
	% T imp	50.0	
	Total Area Check	1.56	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.78	3.90
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	102	0.013

CROZIER CONSULTING ENGINEERS

Project Name:	Glenelg Phase 2	**D.A. NAME**	**TR-1**
Project Number:	1060-5545	**D.A. AREA (ha)**	**0.78**
Date:	2023-05-25		
By:	AM		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment TR-1
Uncontrolled Area to CP Rail Trail

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic Group	% Area	Area
Listowel Silt Loam	Ls	BC	100	0.78
Total Area Check				0.78

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Ls	0.00	98	0.00	98	0.00	98	0.15	98		50	0.15	14.98
		98		98		98		98		50	0	0
		98		98		98		98		50	0	0
		98		98		98		98		50	0	0
Subtotal Area	0.00		0.00		0.00		0.15		0			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Ls	0		0		0		0.63	74	0		0.63	46.41
	0		0		0		0		0		0	0
	0		0		0		0		0		0	0
	0		0		0		0		0		0	0
Subtotal Area	0		0		0		0.63		0			

Pervious Area Calculations	Total Pervious Area	0.63	
	Composite Pervious Curve Number	74	
Impervious Area Calculations	Total Directly Connected Area	0.0	
	Total Indirectly Connected Area	0.15	
	Total Impervious Area	0.15	
	% X imp	0	*Min 0.15 used
	% T imp	20	
	Total Area Check	0.78	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.63	3.14
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	0.5	72	0.013