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From:	mglassmail1@gmail.com
Sent:	Monday, January 20, 2020 1:25 PM
To:	'Demetra McBride'
Cc:	'Ty (Etayenesh) Asfaw'; 'Christin Jolicoeur'; 'Aileen Winquist'; 'Benjamin Aiken'; lgarvey@arlingtonva.us
Subject:	Update of information from Dec 3 meeting on stream restoration
Attachments:	DR Trib B tree removals - v 1-20-20.pdf; 1-20-20 tree preserve & growth scenario for distribution.pdf
Importance:	High

Demetra,

Thanks again to you and your colleagues for taking time from your crowded schedules to speak with Kit Norland and myself on December 3rd. I want you to know that I sincerely see each of you as very effective professionals who work hard day after day for the residents of Arlington. My differing perspectives on some issues does not negate this belief.

During our discussions, the issue of the value of planting trees for decades in the future versus preserving existing trees came up. The facts show that **preserving trees should be the first priority** for the immediate health of the public and environment. There is no doubt that planting trees for the future 20 to 50 years from now is also essential. The two are complimentary but both are crucial .

Looking at some hard data may help evaluate this question by giving a better perspective. To do this, I have prepared some analyses using information from the planned Donaldson Run restoration project. I have taken an example of a common tree species, the Northern Red Oak, where one existing 31" tree will be removed and 2" trees will be planted for restoration. All assumptions about growth rates are based on accepted professional standards and the i-Tree model is used to describe the impacts. The i-Tree model has been used by Vincent Verwiej to estimate the value of Arlington's trees as a whole.

As you can see on the attached spreadsheet, a single 2" tree replanted has very limited stormwater, environmental, and financial value compared to the 31" tree today. This is to be expected. The quantitative comparison in the attached spreadsheet shows that **the current 31" tree intercepts 11,748 gallons of stormwater while the 2" tree only intercepts 51 gallons**.

The problem arises when the impacts are assessed in the future after existing trees are removed.. For planning restoration planting, a minimum goal of 20% replacement of the tree canopy in 20 years is often used. To the County's credit, some projects have much more ambitious plans exceeding this standard. Still, the enhanced planting does not address the question of the total impact both today and in the future of significant loss of benefits. In 20 years, unfortunately, only 1,211 gallons of stormwater will be intercepted by the then 10" dbh tree. **After 20 years, it would still require <u>six</u> 10" trees to equal the overall benefits and <u>ten</u> 10" trees to equal the stormwater benefits of <u>one</u> 31"today**(assuming the 31" does not grow anymore). It is estimated that it will be 72 years before the 2" tree grows to 31".

A more detailed picture of the impacts of this scenario is presented in the attachments. It looks at all the i-Tree benefits individually and collectively including some financial values. These benefits are: Overall $ benefits, Stormwater interception (gallons), Property Value $, Energy Savings (Kwh), Air Quality (oxygen released, volatile organic compounds, NO2-deposition & avoidance, SO2- deposition & avoidance, Particulate matter- PM10 deposition and avoidance), and carbon dioxide-CO2 sequestered and avoided. The carbon dioxide numbers are particularly noteworthy.

In the case of Donaldson Run Tributary B, over 80 trees will be removed of various sizes and over 50 more compromised by root trimming. This will include two Northern Red Oaks 26" and 31" dbh according to the inventory. Far more **tuliptrees will be removed including two over 30", seventeen between 20" and 29", and eleven between 15" and 19".** The full list Is attached.

While questions will be raised about the specifics of the information provided here, there is no doubt that the cumulative detrimental effects of tree removal from Donaldson Run and other Copunty-associated projects are devastating in the short run. Even assuming some loss of mature trees over 20 to 50 years, the growth of new trees will not provide a net increase in benefits to the community from the overall canopy. Also, with a high rate of loss of young trees to various factors, especially flooding in Donaldson Run for example, it cannot be assumed that they will provide the full benefits assumed here decades from now.

Once again, thank you for your attention. I would be pleased to continue to discuss this issue of tree preservation and alternatives to the current stream "restoration" program such as "stabilization and maintenance" approach that minimizes land disruption.

Regards,
Mary Glass

Tree Benefits from Preserving Standing Trees Compared to New Plantings Now and in 20 Years

Northern Red Oak	Est. high growth rate-inches dbh =	0.4
	Total growth over 20 years in inches =	8

		2" tree today	10" tree in 20 years	31" tree today
Overall $ benefits		$ 3	$ 37	$ 218
Stormwater intercept (gals)		51	1,211	11,748
Property value $/yr		$ 2	$ 15	$ 50
Energy - electric kwh		2	53	281
Air quality	oxygen released in $	$ 0.0	$ 0.5	$ 3.2
	Volatile organic comp	$ 0.0	$ 0.2	$ 0.7
	NO2 - Dep	$ 0.0	$ 0.2	$ 1.0
	NO2 - Avd	$ 0.0	$ 0.7	$ 3.6
	SO2 Dep	$ 0.0	$ 0.0	$ 0.2
	SO2 Avd	$ 0.0	$ 0.5	$ 2.5
	PM 10 Dep	$ 0.0	$ 0.2	$ 1.1
	PM 10 Avd	$ 0.0	$ 0.0	$ 0.2
	total	0.14	2.31	12.50
	CO2 Sequestered-lbs	30	240	1000
	CO2 Avoided- lbs	2	40	245

Planting to equal one tree removed	
# of 2" trees now to equal one 31" tree removed today	# of 10" trees in 20 years to equal one 31" tree today
73	6
230	10
25	3
141	5
107	6
70	5
100	6
90	5
20	10
125	5
110	6
20	5
13.5	5
33	4
123	6

Planting to equal one tree removed	
31" tree in 20 years with .2 in ave dbh growth = 35"	# of 10" trees in 20 years to equal one 35" tree remaining
260	7
14,829	12.2
56	3.7
320	6.0
3.50	6.48
0.80	5.33
1.10	6.11
4.10	5.69
0.20	10.00
2.80	5.96
1.20	6.32
0.30	7.50
13.5	5.84
1250	5.2
146	3.7

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Estimated future size of typical Northern Red Oak

2" after 20 years @ .4 " growth rate	10
2" after 30 years @ .4 " growth rate	14
2" after 40 years @ .4 " growth rate	18
2" after 50 years @ .4 " growth rate	22
2" after 60 years @ .4 " growth rate	26
2" after 72 years @ .4 " growth rate	31

TREE# (Removed)	SPECIES (Roots Pruned)	DBH	CONDITION	SPECIES RATING	REPLACEMENT VALUE	REPLACEMENT TREE	COMMENTS	REMOVE TREE		TT OVER 30"	TT 20-29"	TT 15" to 19"	TT 9" to 14"	TT less than 9"	North Red Oak	Amer Beech
1	BLACK LOCUST	19	50	55	5.2	2		X								
2	RED MAPLE	18	60	75	8.1	2	ONE-SIDED CROWN	X								
4	BLACK LOCUST	22	40	55	4.8	1	CROWN FORM	X								
4a	TULIPTREE	9				1		X	TT				1			
10	TULIPTREE	16	45	75	5.4	2		X	TT			1				
11a	GREEN ASH	6				1		X								
12	RED MAPLE	12	60	75	5.4	2		X								
13	RED MAPLE	11	65	75	5.4	2		X								
14	BLACK LOCUST	24	60	55	7.9	2	SLIGHTLY UNDERCUT - ROOTS	X								
16a	RED MAPLE	6				1		X								
19	TULIPTREE	20	75	75	11.3	3		X	TT		1					
20	TULIPTREE	18	70	75	9.5	2		X	TT			1				
21	TULIPTREE	16	60	75	7.2	2		X	TT			1				
21a	AMERICAN BEECH	6				1		X								1
21b	BLACK CHERRY	6				1		X								
22	TULIPTREE	21	70	75	11.0	3		X	TT		1					
23	TULIPTREE	12	60	75	5.4	2		X	TT				1			
23b	TULIPTREE	14	45	75	4.7	1	CROWN MISSING	X	TT				1			
25	SYCAMORE	24	70	65	10.9	3	FILL FOR TRAIL SHIFT	X								
26	TULIPTREE	14	45	75	4.7	1	TRUNK DAMAGE	X	TT		1					
30	TULIPTREE	30	75	75	16.9	4		X	TT	1						
31	TULIPTREE	26	70	75	13.7	3		X	TT		1					
31b	TULIPTREE	4				1		X	TT					1		
34	TULIPTREE	9				1		X	TT				1			
35	TULIPTREE	17	75	80	10.2	3		X	TT			1				
36a	TULIPTREE	5				1		X	TT					1		
36b	TULIPTREE	5				1		X	TT					1		
38	TULIPTREE	9				1	TRAIL SHIFT - 4'	X	TT				1			
40a	DOGWOOD	3				1		X								
46	TULIPTREE	16	75	60	7.2	2	STREAM BED UNDERCUT	X	TT			1				
48a	AMERICAN BEECH	4				1	TRAIL SHIFT	X								1
54	TULIPTREE	20	50	75	7.5	2	ROOTS SEVERELY UNDERCUT BY	X	TT		1					
54a	MAPLE	8				1		X								
55	TULIPTREE	22	60	75	9.9	2		X	TT		1					
56	TULIPTREE	24	65	75	11.7	3		X	TT		1					
58	TULIPTREE	20	70	75	10.5	3		X	TT		1					
62	TULIPTREE	28	50	75	10.5	3	ROOTS SEVERELY UNDERCUT BY	X	TT		1					
63	TULIPTREE	24	45	75	8.1	2	ROOTS SEVERELY UNDERCUT BY	X	TT		1					
63a	RED MAPLE	5				1		X								
65a	NORWAY MAPLE	3				1		X								
66	TULIPTREE	25	60	75	11.3	3	ROOTS SLIGHTLY UNDERCUT BY	X	TT		1					
67	RED MAPLE	20	50	75	7.5	2		X								
72a	BLACK CHERRY	4				1		X								
75	NORTHERN RED	26	60	80	12.5	3		X								1
76	NORTHERN RED	31	65	80	16.1	4		X								1
76a	TULIPTREE	8				1		X	TT					1		
77	WHITEOAK	25	50	90	11.3	3	ROOTS UNDERCUT BY STREAM	X								
78	WHITEOAK	26	70	90	16.4	4		X								
79	TULIPTREE	30	75	75	16.9	4	STACKED WALL?	X	TT	1						
80a	RED MAPLE	5				1		X								
80b	GREEN ASH	18	65	60	7.0	2	UNDERCUT	X								
81	HICKORY	28	70	75	14.7	3		X								
82	TULIPTREE	24	70	75	12.6	3		X	TT		1					
83	TULIPTREE	16	60	75	7.2	2		X	TT			1				
84	TULIPTREE	18	60	75	8.1	2		X	TT			1				
84b	TULIPTREE	24	65	75	11.7	3		X	TT		1					
85	TULIPTREE	22	60	75	9.9	2	ROOTS UNDERCUT BY STREAM	X	TT		1					
85b	TULIPTREE	4				1		X	TT					1		
88	TULIPTREE	22	70	75	11.6	3		X	TT		1					
89	TULIPTREE	15	40	75	4.5	1		X	TT			1				
90	TULIPTREE	22	70	75	11.6	3		X	TT		1					
91	TULIPTREE	16	50	75	6.0	2	HALF ROOT SYSTEM UNDERCUT	X	TT			1				
93b	TULIPTREE	8				1		X	TT			1				
93c	TULIPTREE	10				1		X	TT				1			
97a	AMERICAN BEECH	6				1		X								1
97b	BLACK CHERRY	4				1		X								
97c	AMERICAN BEECH	4				1		X								
97d	AMERICAN BEECH	6				1		X								
98	TULIPTREE	24	50	75	9.0	2	ROOTS SEVERELY UNDERCUT BY STREAM	X	TT		1					
98a	AMERICAN BEECH	4				1	ROOTS SEVERELY UNDERCUT BY STREAM	X								1
106a	TULIPTREE	6				1		X	TT					1		
106c	TULIPTREE	6				1		X	TT					1		
106d	TULIPTREE	6				1		X	TT					1		
106e	TULIPTREE	6				1		X	TT					1		
1061	TULIPTREE	6				1		X	TT					1		
106g	TULIPTREE	6				1		X	TT					1		
106h	AMERICAN BEECH	4				1		X								1
107	TULIPTREE	16	60	75	7.2	2		X	TT			1				
107a	ELM	8				1	LEANING	X								
118	LONDON	7	55	65	2.5	1		X								
119	LONDON	15	70	65	6.8	2		X								
									47	2	17	11	6	11		
										47						