



Town of Westport

Water Pollution Control Authority

“INFLOW AND INFILTRATION (I&I) ABATEMENT POLICY”

Dated - January 1, 2006

REVISED - July, 2020

Definition & Rate Structure

Any property that increases its development over its existing status, resulting in an increased effluent discharge to the sanitary sewer system, and when such discharge is over and above the existing discharge, the property will be subject to all or part of the following requirements:

- Flow analysis of the downstream system.
- Improvements to the down stream system if the flow analysis identifies that the proposed development creates overburden
- I&I Abatement Fees, based on the following criteria:

Average Person / Single Family Dwelling = 2.79 People (p.5-7, Facility Plan)

X Average Flow per Person / per Day = 98 Gallons (p.5-7, Facility Plan)
 273.42 Gallons / Single Family Dwelling / per Day

273.42 Gallons / Day X 4 (Peaking Factor) = 1,093.68 gpd (Gallons per Day Peak Flow)

Average cost to remove I&I (Peak gpd) = \$ 5.33 / gpd

Therefore, the “I&I Abatement Fee” per Single Family Dwelling Unit will be:

1093.68 gpd
 X \$ 5.33 gpd
 \$ 5,829.31 / Unit

* Commercial Space (retail, Office...etc) will be evaluated on a case by case basis on estimated effluent flows and data supporting these estimates.

Attachment #3 - 11 Pages



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MEMORANDUM

TO: Mr. Bryan Thompson – Town of Westport WPCA Coordinator
FROM: Weston & Sampson
DATE: February 2019
SUBJECT: WPCA Flow Evaluation

Weston & Sampson was retained by the Town of Westport, Connecticut to perform wastewater collection system flow evaluation services to assist the Town in better understanding flow allocations within the existing Sewer Service Area (SSA) and the impact on the wastewater treatment plant.

The goal of this evaluation was to identify the volume of flow that would be expected from full buildout within the SSA and compare that number to wastewater flows that are currently being observed at the wastewater treatment plant. This evaluation relied heavily upon the Town's GIS to identify and tabulate parcels within the SSA that are not currently connected to the system and assign a flow volume to each parcel. The NPDES Permit #CT0100684, which expired in 2012, assigned a design flow rate of 2.85 MGD prior to the completion of an expansion of the treatment plant, and 3.30 MGD after completion of the expansion.

To accomplish this assignment, Weston & Sampson reviewed existing planning documents and mapping, assessed the current sewer capacity needs, and developed this technical memorandum describing the efforts and summarizing the findings. Each item from the scope is addressed below.

Review of Existing Planning Documents and Mapping

Weston & Sampson completed a review of the following documents:

- Town of Westport Wastewater Facilities Report from Stearns & Wheeler, LLC March 2002
- Town of Westport Sewer Assessment Manual and Procedures by Valerie Ann Votto, Assistant Town Attorney, and Donald J. Miklus, Controller, June 1988
- Westport WPCF Monthly Operating Report (MOR) Data from 2012 through 2018

Weston & Sampson obtained the following items from the Town's GIS data:

- Existing sanitary sewer service area (SSA) map from the WPCA
- Existing sewer mapping from the WPCA
- Most recent Plan of Conservation and Development from Town Planning & Zoning
- CT OPM Conservation & Development Plan – Locational Guide Map
- 2018 Sewer Billing Final Excel Spreadsheet

Assessment of Current Sewer Capacity Needs

GIS Database Analysis

Weston & Sampson assessed the GIS data provided by the Town, and coordinated with the Westport WPCF staff to overlay the WPCA's SSA.

Out of the total database, the SSA includes 7,686 parcels, covering an area of approximately 6,300 acres. Weston & Sampson identified the zone of each parcel based on its location. Table 1: Planning and Zoning Parcels below shows the zone descriptions, as described in Attachment 1, and the corresponding number of parcels assigned to each zone.

Table 1: SSA Parcels by Zoning District

Zoning District	Description	Number of SSA Parcels
A	0.5 Acre Zones	3,790
AA	1-acre Zone	2,584
AAA	2-acre Zone	186
B	6,000 square feet	230
BCD	Business Center District	55
BCD/H	Business Center District/Historic	10
BPD	Business Preservation District	32
CPD	Corporate Park District	5
DDD2	Design Development District	22
DDD4	Design Development District	3
DOSRD1	Dedicated Open Space and Recreational District	2
DOSRD2	Dedicated Open Space and Recreational District	1
DOSRD3	Dedicated Open Space and Recreational District	5
GBD	General Business District	205
GBD/S	General Business District Saugatuck	4
HDD	Historic Design District	5
HSD	Highway Services District	11
MHP	MHPD Mobile Home Park District	62
MHZ	Municipal Housing Zone	1
OSRD	Open space Residential District	13
PRD	Planned Residential Development	253
R-AHZ	Residential Affordable Housing Zone / Workforce	4
R-AHZ / W	Residential Affordable Housing Zone	20
RBD	Restricted Business District	29
RORD1	Restricted Office-Retail District	55
RORD2	Restricted Office-Retail District	42
RORD3	Restricted Office-Retail District	31
RPOD	Restricted Professional Office District	25
R-RHOW	Description Not Available	1
	TOTAL	7,686

Wastewater Flow Analysis

The Town provided sewer billing data that was used as the source of determining the connection status of each parcel. Based on current data, each parcel was assigned to one of seven categories as shown in Table 2 below:

Table 2: Parcel Sewer Status

Category	Description	Zone			Number of Parcels
		Residential ¹	Commercial ²	Town ³	
Connected (Already in Sewer)	Parcels connected to the sanitary sewer	4,307	362	21	4,690
Not Connected (Adjacent Infill)	Parcels that are adjacent to the existing sewer and may have laterals but are not yet connected.	559	13	2	574
In Sewer Service Area (Sewer Extension)	Parcels in the sewer service area, but may require sewer main line extension.	2,328	47	0	2,375
Cemetery and Historic Site (No Sewer Flow)	Parcels on file with the Town as being either cemeteries or official historic sites	6	0	0	6
Nature Reserve and Trust (No Sewer Flow)	Parcels on file with the Town as official nature reserves or trusts which will not be developed for connection to the sewer.	4	1	0	5
Parking Lots and Traffic Islands (No Sewer Flow)	Parcels owned by the Town that will not generate current or future wastewater flows because they are designated parking lots and traffic islands.	0	0	5	5
Wetland and Tidal Swamp (No Sewer Flow)	Parcels on file with the Town as Wetlands or Tidal Swamps that would not be connected to the sewer.	28	1	2	31
Total:		7,232	424	30	7,686

The figure in Attachment 2 shows the connected parcels in green, the not connected parcels in pink, the in sewer service area parcels in yellow, cemetery and historical site parcels in orange, nature reserve and trust parcels in lilac, parking lots and traffic islands in grey, and wetland and tidal swamp parcels in blue.

If a parcel is shown as connected to the existing system, then wastewater flow from that parcel is already accounted for in the metered flows received at the WPCF. Additional wastewater production would be generated

¹ Residential includes 39 connected parcels listed as "Res/Comm" and 3 connected properties listed as "WHA"

² Commercial includes 1 connected parcel listed as "Utility" and 1 connected parcel that did not have a residential/commercial status

³ Town includes 1 connected parcel identified as "State"

by the connection of "infill" properties, which are those shown currently as "not connected." Infill flows were based on the maximum use of the property as defined by current zoning limitations. The Westport Wastewater Facilities Plan bases its sewer usage on units, each of which is defined as contributing 274 gpd to the collection system (per 2002 Facilities Plan).

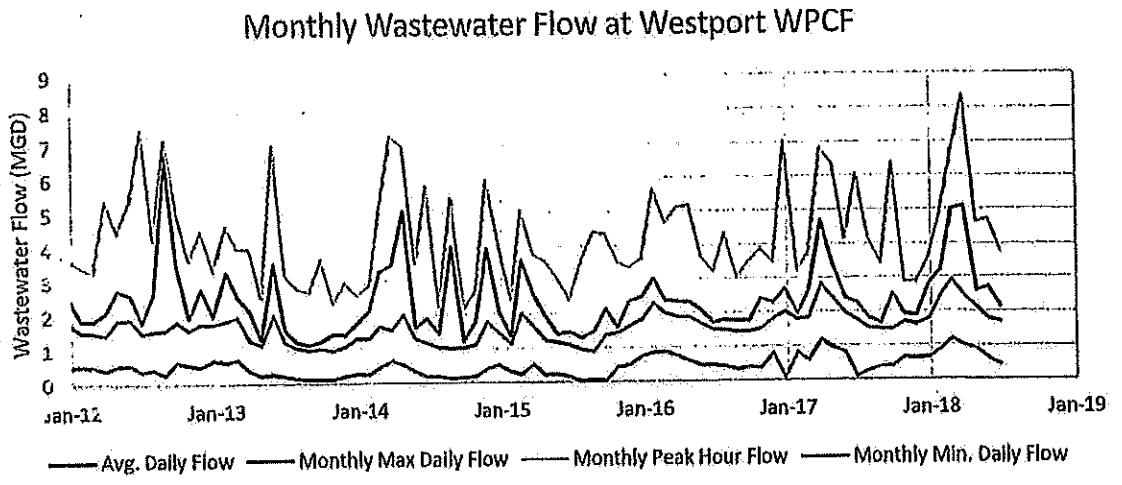
The data classified the parcels as either residential, commercial, or owned by the Town, but many fields were blank. Where there was no classification, either "commercial" or "residential" was assigned to the parcel based on zoning designation. The analysis data is presented in Attachment 4.

For this estimate, parcels in zones labeled as "residential" counted as one unit, and commercial and Town parcels were assigned a number of units equal to their area divided by 1,000 (per 1988 Sewer Assessment Regulations). The total number of units per parcel were multiplied by 274 gpd to calculate the projected infill flow as summarized in Table 3 below.

Table 3: Projected Infill Flow

	Not Connected Adjacent Infill		In SSA Sewer Extension Infill		Total Infill	
	# Parcels/ Acres	Flow (gpd)	# Parcels/ Acres	Flow (gpd)	# Parcels/ Acres	Flow (gpd)
Residential	559 parcels	153,166	2,328 parcels	637,872	2,887 parcels	791,038
Commercial	13 parcels / 7 ac.	86,858	47 parcels / 46 ac.	210,706	60 parcels / 53 ac.	297,564
Town	2 parcels / 0.6 ac	7,124	0 parcels / 0 ac.	0	2 parcels / 0.6 ac	7,124
TOTAL	574 parcels	247,148	2,375 parcels	848,578	2,949 parcels	1,095,726
Total Infill		0.25 MGD		0.85 MGD		1.10 MGD
Annual		90 MG		310 MG		400 MG

Weston & Sampson tabulated data from the Westport WPCF Monthly Operating Reports (MOR) from 2012 through 2018. The graph below shows the monthly wastewater flows, and a table of the associated data is included as Attachment 3.



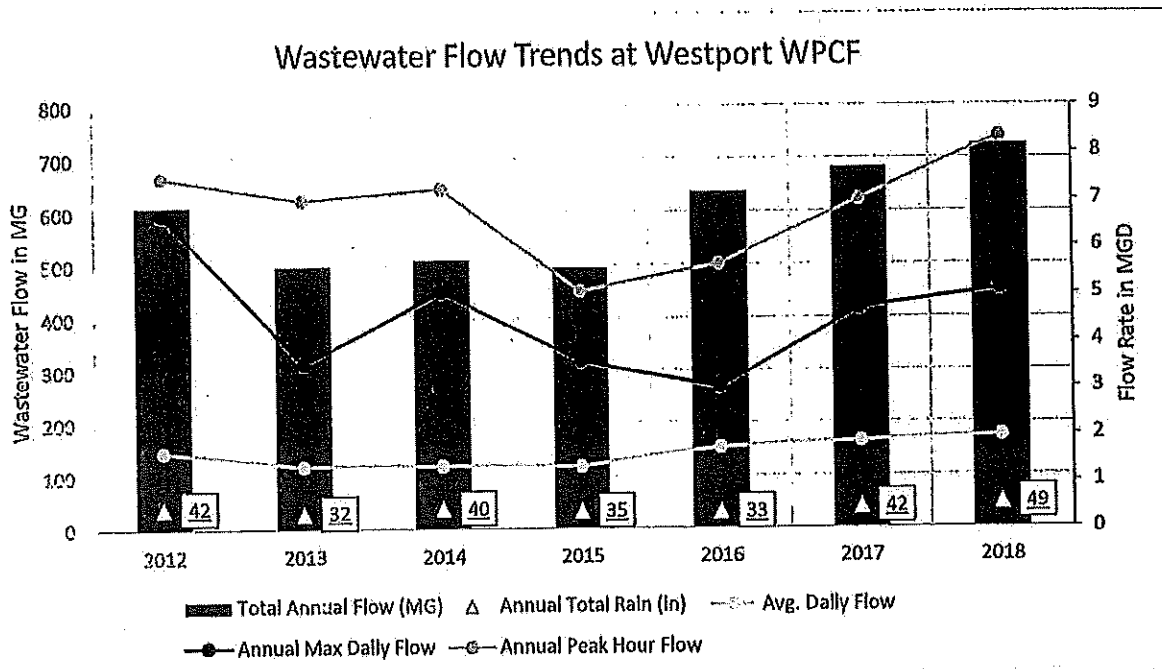
Based on total monthly flows in million gallons (MG), and average daily, maximum daily, and peak hour flow rates in million gallons per day (MGD), Weston & Sampson calculated the annual total flow, and the average daily, maximum daily, and peak hour flow rate for the available years, as summarized in Table 4 below:

Table 4: Westport WPCF Historical Flows

Year	Total (MG)	Annual Total Rain (in)	Avg. Daily Flow (MGD)	Max Daily Flow (MGD)	Peak Hour Flow (MGD)
2012	612	42	1.67	6.70	7.50
2013	499	32	1.37	3.52	7.03
2014	511	40	1.38	5.05	7.27
2015	495	35	1.35	3.57	5.07
2016	639	33	1.75	3.00	5.65
2017	683	42	1.87	4.68	7.02
2018	726*	49*	1.97*	5.07	8.33
AVERAGE	595	39	1.62	4.51	6.84

* *Italicized flows contain projections*

The graph below shows a bar graph of the total annual flow with a scatter plot of the average daily, maximum daily, and peak hour flow rates observed at the Westport WPCF from 2012 through 2018. There is an observable upward trend in the flows, particularly in recent years.



Conclusions and Recommendations:

Table 5, below, shows how the projected infill flows would impact the 2012-2018 average WPCF flows, based upon current zoning.

Table 5: Average Westport WPCF Wastewater Flows with Infill

	Total (MG)	Avg. Daily Flow (MGD)	Avg. Max Daily Flow (MGD)	Avg. Peak Hour Flow (MGD)
Current (2012 to 2018) Average SSA Wastewater Flow	595	1.62	4.51	6.84
Anticipated Infill from Not Connected Adjacent Parcels	90	0.25	0.69	1.04
Current Average Plus Adjacent Infill	685	1.87	5.20	7.88
Anticipated Infill from Parcels in the SSA requiring sewer extensions	310	0.85	2.36	3.57
Current Average Plus All Infill	995	2.72	7.56	1.45

Note: A peaking factor was applied to the anticipated flows based on the average max daily and average peak hour flows compared to the average daily flow respectively.

Similarly, Table 6 below shows how the projected infill flows would impact the 2018 WPCF flows.

Table 6: 2018 Westport WPCF Wastewater Flows with Infill

	Total (MG)	Avg. Daily Flow (MGD)	Max Daily Flow (MGD)	Peak Hour Flow (MGD)
2018 SSA Sewer Flow	726	1.97	5.07	8.33
Anticipated Infill from Not Connected Adjacent Parcels	90	0.25	0.69	1.04
2018 SSA Plus Adjacent Infill	817	2.22	5.76	9.37
Anticipated Infill from Parcels in the SSA requiring sewer extensions	310	0.85	2.36	3.57
2018 SSA Plus All Infill	1,126	3.07	8.12	12.95

Note: The same peaking factors calculated above were applied to the anticipated flows as calculated above.

Table 6 above shows that the projected average daily flows to the WPCF, resulting from connection of infill parcels within the SSA, at their current zoned density, is estimated to be 3.07 MGD. Therefore, at full build out, consistent with current zoning, the WPCA has effectively reached its NPDES permit limit as it relates to average daily flow. Therefore, if new development is proposed within the SSA, with a density greater than currently zoned, then there is a risk of exceeding the NPDES permit average daily flow limit.

Weston & Sampson Recommends:

1. Further investigation into the upward trending flow rates observed at the Westport WPCF.
2. Updating sewer-based GIS data, including pipe flow direction and parcel-based sewer connectivity statuses.
3. Conduct an infiltration and inflow abatement study to evaluate and mitigate sources of extraneous flow in your existing collection system.

Attachments:

1. Establishment of Zoning Districts and Maps page 4-1
2. Westport Sewer Connection Status Map January 2019
3. Westport WPCF Monthly Flows
4. Westport Parcel Analysis

Attachment 1

Establishment of Zoning Districts and Maps page 4-1

§4 ESTABLISHMENT OF ZONING DISTRICTS AND MAP

Revised 11-12-17

4-1 Districts Established

The Town of Westport is divided into the following classes of Districts:

SECTION	DISTRICT
11	Residence AAA District - 2 acre zone
12	Residence AA District - 1 acre zone
13	Residence A District - 1/2 acre zone
14	Residence B District - 6,000 square feet
15	Planned Residential Development (PRD)
16	Mobile Home Park District (MHPD)
17	Open Space Residential District (OSRD)
18	Residence C District - (MFD)
19	Affordable Housing Zone (R-AHZ)
19A	Residential Affordable Housing Zone/Workforce (R-AHZ/W)
20	Municipal Housing Zone (MHZ)
21	Restricted Professional Office District (RPOD)
22	Restricted Office-Retail District (RORD #1)
22A	Restricted Office-Retail District (RORD #2)
22B	Restricted Office-Retail District (RORD #3)
23	Restricted Business District (RBD)
24	General Business District (GBD)
24A	General Business District Saugatuck (GBD/S)
25	Highway Service District (HSD)
26	Design Development District (DDD)
27	Corporate Park District (CPD)
28	Business Preservation District (BPD)
29	Business Center District (BCD)
29A	Business Center District/Historic (BCD/H)
30	Historic Design District (HDD)
39A	Inclusionary Housing Overlay District (IHZ)
40	Dedicated Open Space and Recreation District #1, #2 and #3 (DOSRD)

MEMORANDUM

TO: Bryan Thompson
FROM: Weston & Sampson
DATE: June 29, 2020
SUBJECT: I/I Abatement Policy Revision

Weston & Sampson was retained by the Town of Westport, Connecticut to revise and update the fee rate assessed to developers under the Town's Inflow and Infiltration (I/I) Abatement Policy that was adopted in 2006. New developments within the sanitary sewer service area have strained the existing sewer collection system and treatment plant through the addition of higher-than-planned sewer flows. As new developments continue to contribute additional flow to the existing system, Westport plans to offset the additional flow by removing extraneous flows from infiltration and inflow. These reductions in I&I are to be funded by the fees collected through the I&I Abatement Policy.

The goal of this memorandum is to develop and recommend a current per-gallon I&I Abatement Rate for use in the current Westport I/I Abatement Policy. Weston & Sampson has extensive knowledge about the costs associated with I/I removal projects, having performed hundreds of studies, evaluations, analyses, design, and construction of I&I removal projects throughout the northeast. Using data from recently completed infiltration and inflow evaluations, Weston & Sampson identified an appropriate abatement fee and computation approach using the following methodology:

Method

Weston & Sampson maintains a database of cost information resulting from I&I studies and Sewer System Evaluation Surveys (SSES) that were performed in accordance with the "Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Survey" published by the Massachusetts DEP. The data sets used identified sewer collection system defects, the associated I/I flowrates targeted for removal, the recommended repairs, and the costs associated with those repairs from multiple projects recently completed in both Connecticut and Massachusetts. Data collected from each source included:

- Location
- Year/Date
- Targeted Infiltration & Inflow Totals
- Removal Costs for Targeted Flows

For this memorandum, Weston & Sampson has assembled the data to identify the expected costs for I&I removal based on estimated "opinions of cost" and the targeted volume of I&I identified for removal under each of these projects.

The Town of Westport's current I-I Abatement Fee Policy applies to any property that increases its level of development or sewer usage over its existing status, resulting in an increased sewage discharge to the sanitary sewer system. The charges assessed to such properties are currently based on the following rate structure:

Existing Rate Structure (based on "Equivalent Dwelling Unit" (EDU):

Average Persons / Single Family Dwelling (p. 5-7, Facility Plan).....	2.79
Average Flow per Person / per Day (p. 5-7, Facility Plan)	98 gpd
Average Flow per Single Family Dwelling ("EDU") = (2.79 x 98)	273.42 gpd
Peak Flow per EDU at 4.0 Peaking Factor (273.42 x 4.0).....	1,093.68 gpd
Average Cost to Remove I&I (per gpd)	\$2.50
Total I&I Abatement Fee per EDU (1,093.68 x \$2.50).....	\$2,734.20

Assessment / Recommended Abatement Fee per EDU

Weston & Sampson chose four (4) sets of data that are relatively current and have geographic similarities to Westport's collection system. Manhole and pipeline cost effective data for this analysis was gathered from:

- Stafford, CT
- Bethel, CT Subareas 9, 12, and 15
- Bethel, CT Subarea 14
- Milton, MA

System Evaluated	Total I&I Targeted for Removal	Identified / Estimated Removal Costs	Cost per Gallon for Targeted I&I Removal
Stafford, CT	165,000	\$730,000	\$4.42
Bethel, CT (SA 9-15)	145,000	\$699,000	\$4.82
Bethel, CT (SA 14)	155,000	\$720,000	\$4.65
Milton, MA	120,000	\$970,000	\$8.08
Weighted Average:			\$5.33

Based on projects in similar sized communities, removal costs fall into the range of \$4.42 to \$8.08 per gallon targeted for removal. As such, this memorandum suggests that the Town of Westport establish an Abatement Rate for properties at \$5.33 per gallon targeted for removal, based on the weighted average of the above cited project results.

It is acknowledged that the result and recommendation made above is based on broad assumptions that do not attempt to either qualify or quantify the detailed differences between these systems. Instead, understanding that the identification of infiltration and inflow within existing sanitary sewer systems is broad interpretation of testing results, the Town of Westport has requested a recommended I&I removal charge that is realistic and based upon similar broad interpretation of observable data from similar communities and systems.

A proposed Rate Structure can be established as follows, based on the Town's existing policy, with the addition of the above recommended rate and the 4:1 abatement ratio:

PROPOSED ABATEMENT FEE COMPUTATION:

Recommended Rate Structure (based on "Equivalent Dwelling Unit" (EDU):

Average Persons / Single Family Dwelling (p. 5-7, Facility Plan)	2.79
Average Flow per Person / per Day (p. 5-7, Facility Plan)	98 gpd
Average Flow per Single Family Dwelling ("EDU") = (2.79 x 98)	273.42 gpd
Peak Flow per EDU at 4.0 Peaking Factor (273.42 x 4.0).....	1,093.68 gpd
Average Cost to Remove I&I (per gpd)	\$5.33
Recommended I&I Abatement Fee per EDU (1,093.68 x \$5.33)	\$5,829.31

Application of the Abatement Fee would apply to properties and/or developments that request a change in use and/or increase in flow above the existing parcel(s)' existing flow allocation. The fee would be levied upon the difference (increase) in flow allocation as follows:

Sample Calculation:

Existing Flow Allocation	273 gpd.....	(1 EDU)
Requested Flow Allocation	5,000 gpd.....	(18.3 EDUs)
Requested Increase in Flow Allocation:	4,725 gpd.....	(17.3 EDUs)
I&I Assessment Rate:.....	\$5,829.31	(per EDU)
Total Abatement Fee Levied (17.3 x \$5,829.31):		\$100,737

The assessment rate per EDU should be updated periodically, on an interval as determined most appropriate by the WPCA. Undoubtedly, the cost for I&I abatement and removal will increase over time as the costs of construction, costs of living, and permitting issues increase. As such, the development and review of proposed sewer allocations for new developments must be based upon defined and accepted industry values. The Town should consider establishment of a defined set of sewer development flow parameters upon which developers are mandated to base their proposed flows.

8. Presentation of Supplemental Soil Investigation and Preliminary Risk Assessment Report, Baron's South Property, conducted by Thunderbird Environmental, LLC, to present findings of additional investigations, analyses, and to make recommendations for disposition of the excess fill associated with the expansion and site improvements at the Westport Center for Senior Activities, (WCSA). Available for review on the Town's website at <https://www.westportct.gov/government/baron-s-south-stockpile-2019>