ANLAUF ENGINEERING, PLLC
Joseph J. Anlauf, P.E.
Firm License P-0929

October 28, 2016

Mr. Scott Vinson
NCDEQ, Washington Regional Office
943 Washington Square Mall
Washington, NC 27889

Re: Variance Request
KDHWWTP
Kill Devil Hills, NC 27949

Dear Scott,

We recently processed a request to retract the portion of the permit application pertaining to the expansion of the disposal area for the KDHWWTP. This was due to questions over compliance with the "green space" requirement described under 15A NCAC 02H .0404 (g)(7).

In a letter dated October 13, 2016 and an accompanying plat (see attached) we describe how this project meets the intent of the regulation and has 100% repair area for the disposal system. This 100% repair area is comprised of 19.72 acres of "green space" and 2.89 acres of HRI disposal area.

We respectfully request a variance to 15A NCAC 02H .0404 (g)(7) citing that the project area contains ample area to repair the disposal system at the total design flow of 660,000 gpd and meets the intent of the regulation.

Please forward this request on to the central office in Raleigh. Please call with any questions at (252)489-7143.

Sincerely,
Anlauf Engineering, PLLC

Joseph J. Anlauf, PE

Enclosed: as stated
Cc: Eddie Goodrich – KDHWWTP, LLC
Mike Robinson, PE

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October 13, 2016

Mr. Scott Vinson
NCDEQ, Washington Regional Office
943 Washington Square Mall
Washington, NC 27889

Re: Green Space Calculation
KDHWWTP
Kill Devil Hills, NC 27949

Dear Scott,

In response to questions regarding the green space available to serve the wastewater disposal area and current disposal area expansion request the following information is being offered.

The proposed total design flow of the WWTP under the disposal area expansion request is 660,000 gpd.

15A NCAC 02H .0404 (g)(7) requires 2,500 sq.ft. of "green area" for every 1,000 gallons of wastewater to be disposed. It appears that the intent of the regulation is to "reserve" open green area to act as repair area if the primary disposal area should experience a failure.

The following paragraphs offer evidence that adequate area is available for the disposal of 660,000 gpd.

The current size of the irrigation zone is 44.27 acres. Of that area 24.55 acres is wetted by irrigation. This leaves 19.72 acres of irrigation zone not wetted and available for "green area".

By 15A NCAC 02H .0404 (g)(7) each acre (43,560 sq.ft.) can dispose of 17,424 gpd. The following equation translates the "green space" area to a disposal rate:

43,560 sq.ft./acre x 1000 gpd/2,500 sq.ft. = 17,424 gpd/acre

An area of 19.72 acres can then dispose of 343,601 gpd by the following calculation:

17,424 gpd/acre x 19.72 acres = 343,601 gpd

This results in the need to find "green space" or "repair area" for 316,399 gpd (660,000 gpd – 343,601 gpd).

4721 W. Eckner St., Kitty Hawk, North Carolina (252)489-7143

The attached map illustrates additional "green space" available for the disposal of 316,399 gpd. The subject area is an open area configured in a natural high sandy ridge. The total area shown in cross hatch is approximately 136,361 sq.ft. Within the hatched area are High Rate Infiltration disposal areas 3, 4 & 5. When the areas of those disposal areas are subtracted from the total hatched area the area becomes 125,680 sq.ft.(or 2.89 acres) This area is available for disposal potentially configured as reclaim surface drip irrigation. If the disposal area was configured in that way the system could be positioned to work with the existing dune land topography and be over relatively uniform clean sandy soils with a very high permeability. The following equation offers insight into a potential application rate:

316,361 gpd/125,680 sq.ft. = 2.51 gpd/sq.ft.

The soils in the vicinity of disposal areas 3, 4 & 5 can be loaded at 10 gpd/sq.ft. and are loaded at 9.45 gpd/sq.ft. (at least seasonally). A loading rate of 2.51 gpd/sq.ft. is approximately 25% of the current maximum disposal application rate calculated and documented by the NCLSS.

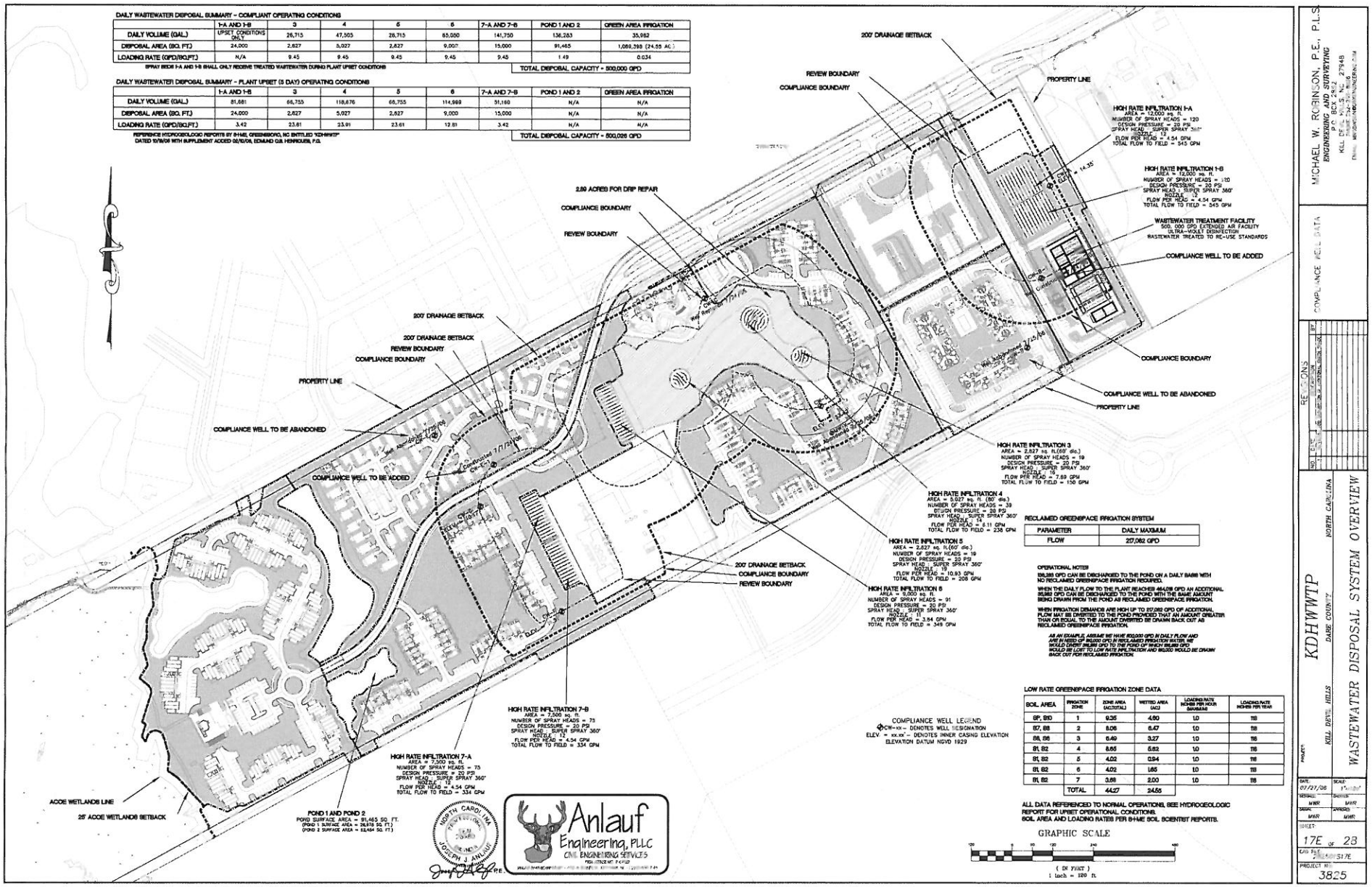
The "green space" requirement is in essence a requirement to have a 100% repair area for the disposal system should said active disposal system, in its entirety, fail. Not only is in extremely unlikely that the entire active disposal system would fail simultaneously the method for determining the "green space" area required does not take into account the nature of the soils and topography in this project area.

The combination of 19.72 acres for reclaim wastewater irrigation and 2.89 acres of open space surface drip disposal will provide 100% repair area for the total system treatment and disposal capacity of 660,000 gpd.

Sincerely,
Anlauf Engineering, PLLC

PE.
Joseph J. Anlauf, PE

Enclosed:
Cc: Eddie Goodrich – KDHWWTP, LLC
Mike Robinson, PE


DAILY WASTEWATER DISPOSAL SUMMARY - COMPLIANT OPERATING CONDITIONS
1-A AND 1-B | 3 | 4 | 5 | 6 | 7-A AND 7-B | POND 1 AND 2 | GREEN AREA IRRIGATION
DAILY VOLUME (GAL.) | UPSET CONDITIONS ONLY | 26,715 | 47,505 | 26,715 | 85,050 | 141,750 | 136,283 | 35,982
DISPOSAL AREA (SQ. FT.) | 24,000 | 2,627 | 5,027 | 2,627 | 9,000 | 15,000 | 91,465 | 1,069,298 (24.55 AC.)
LOADING RATE (GPD/SQ.FT.) | N/A | 9.45 | 9.45 | 9.45 | 9.45 | 9.45 | 1.49 | 0.034
SPRAY BEDS 1-A AND 1-B SHALL ONLY RECEIVE TREATED WASTEWATER DURING PLANT UPSET CONDITIONS
TOTAL DISPOSAL CAPACITY = 500,000 GPD
DAILY WASTEWATER DISPOSAL SUMMARY - PLANT UPSET (5 DAY) OPERATING CONDITIONS
1-A AND 1-B | 3 | 4 | 5 | 6 | 7-A AND 7-B | POND 1 AND 2 | GREEN AREA IRRIGATION
DAILY VOLUME (GAL.) | 81,681 | 66,755 | 118,676 | 66,755 | 114,989 | 51,160 | N/A | N/A
DISPOSAL AREA (SQ. FT.) | 24,000 | 2,627 | 5,027 | 2,627 | 9,000 | 15,000 | N/A | N/A
LOADING RATE (GPD/SQ.FT.) | 3.42 | 23.81 | 23.91 | 23.61 | 12.81 | 3.42 | N/A | N/A
REFERENCE HYDROGEOLOGIC REPORTS BY B-NAE, GREENSBORO, NC ENTITLED "KDHWWTP" DATED 10/26/06 WITH SUPPLEMENT ADDED 02/07/08, EDMUND GIL HENNOUSE, P.G.
TOTAL DISPOSAL CAPACITY = 500,026 GPD
200' DRAINAGE SETBACK
REVIEW BOUNDARY
COMPLIANCE BOUNDARY
PROPERTY LINE
2.69 ACRES FOR DRIP REPAIR
HIGH RATE INFILTRATION 1-A
AREA = 12,000 sq. ft.
NUMBER OF SPRAY HEADS = 120
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 12
FLOW PER HEAD = 4.54 GPM
TOTAL FLOW TO FIELD = 545 GPM
HIGH RATE INFILTRATION 1-B
AREA = 12,000 sq. ft.
NUMBER OF SPRAY HEADS = 120
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 12
FLOW PER HEAD = 4.54 GPM
TOTAL FLOW TO FIELD = 545 GPM
WASTEWATER TREATMENT FACILITY
500, 000 GPD EXTENDED AIR FACILITY
ULTRA-VIOLET DISINFECTION
WASTEWATER TREATED TO RE-USE STANDARDS
COMPLIANCE WELL TO BE ADDED
COMPLIANCE WELL TO BE ABANDONED
HIGH RATE INFILTRATION 3
AREA = 2,627 sq. ft.(60' dia.)
NUMBER OF SPRAY HEADS = 19
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 15
FLOW PER HEAD = 7.89 GPM
TOTAL FLOW TO FIELD = 150 GPM
HIGH RATE INFILTRATION 4
AREA = 5,027 sq. ft. (80' dia.)
NUMBER OF SPRAY HEADS = 39
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 8
FLOW PER HEAD = 6.11 GPM
TOTAL FLOW TO FIELD = 238 GPM
HIGH RATE INFILTRATION 5
AREA = 2,627 sq. ft.(60' dia.)
NUMBER OF SPRAY HEADS = 19
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 19
FLOW PER HEAD = 10.93 GPM
TOTAL FLOW TO FIELD = 208 GPM
HIGH RATE INFILTRATION 6
AREA = 9,000 sq. ft.
NUMBER OF SPRAY HEADS = 91
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 11
FLOW PER HEAD = 3.84 GPM
TOTAL FLOW TO FIELD = 349 GPM
HIGH RATE INFILTRATION 7-A
AREA = 7,300 sq. ft.
NUMBER OF SPRAY HEADS = 75
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 12
FLOW PER HEAD = 4.54 GPM
TOTAL FLOW TO FIELD = 334 GPM
HIGH RATE INFILTRATION 7-B
AREA = 7,300 sq. ft.
NUMBER OF SPRAY HEADS = 75
DESIGN PRESSURE = 20 PSI
SPRAY HEAD : SUPER SPRAY 360°
NOZZLE : 12
FLOW PER HEAD = 4.54 GPM
TOTAL FLOW TO FIELD = 334 GPM
RECLAIMED GREENSPACE IRRIGATION SYSTEM
PARAMETER | DAILY MAXIMUM
FLOW | 227,062 GPD
OPERATIONAL NOTES:
135,393 GPD CAN BE DISCHARGED TO THE POND ON A DAILY BASIS WITH NO RECLAIMED GREENSPACE IRRIGATION REQUIRED.
WHEN THE DAILY FLOW TO THE PLANT REACHES 464,078 GPD AN ADDITIONAL 91,682 GPD CAN BE DISCHARGED TO THE POND WITH THE SAME AMOUNT BEING DRAWN FROM THE POND AS RECLAIMED GREENSPACE IRRIGATION.
WHEN IRRIGATION DEMANDS ARE HIGH UP TO 227,062 GPD OF ADDITIONAL FLOW MAY BE DIVERTED TO THE POND PROVIDED THAT AN AMOUNT GREATER THAN OR EQUAL TO THE AMOUNT DIVERTED BE DRAWN BACK OUT AS RECLAIMED GREENSPACE IRRIGATION.
AS AN EXAMPLE, ASSUME WE HAVE 600,000 GPD IN DAILY FLOW AND ARE IN NEED OF 250,000 GPD IN RECLAIMED IRRIGATION WATER. WE WOULD DIVERT 250,000 GPD TO THE POND OF WHICH 250,000 GPD WOULD BE LOST TO LOW RATE INFILTRATION AND 250,000 WOULD BE DRAWN BACK OUT FOR RECLAIMED IRRIGATION.
COMPLIANCE WELL LEGEND
CW-xx - DENOTES WELL DESIGNATION
ELEV = xx.xx' - DENOTES INNER CASING ELEVATION
ELEVATION DATUM NGVD 1929
LOW RATE GREENSPACE IRRIGATION ZONE DATA
SOIL AREA | IRRIGATION ZONE | ZONE AREA (AC/TOTAL) | WETTED AREA (AC) | LOADING RATE INCHES PER HOUR (MAXIMUM) | LOADING RATE INCHES PER YEAR
BP, BtD | 1 | 9.35 | 4.60 | 1.0 | 78
BT, BtB | 2 | 8.06 | 6.47 | 1.0 | 78
BtB, BtE | 3 | 6.49 | 3.27 | 1.0 | 78
BT, BtC | 4 | 8.65 | 5.82 | 1.0 | 78
BT, BtC | 5 | 4.02 | 0.94 | 1.0 | 78
BT, BtC | 6 | 4.02 | 1.85 | 1.0 | 78
BT, BtC | 7 | 3.88 | 2.00 | 1.0 | 78
TOTAL | | 44.27 | 24.55
ALL DATA REFERENCED TO NORMAL OPERATIONS, SEE HYDROGEOLOGIC REPORT FOR UPSET OPERATIONAL CONDITIONS.
SOIL AREA AND LOADING RATES PER B-NAE SOIL SCIENTIST REPORTS.
GRAPHIC SCALE
120 0 60 120 240 480
(IN FEET)
1 inch = 120 ft.
ACOE WETLANDS LINE
25' ACOE WETLANDS SETBACK
POND 1 AND POND 2
POND SURFACE AREA = 91,465 SQ. FT.
(POND 1 SURFACE AREA = 26,878 SQ. FT.)
(POND 2 SURFACE AREA = 64,484 SQ. FT.)
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL JOSEPH J. ANLAUF
Anlauf Engineering, PLLC
CIVIL ENGINEERING SERVICES
MICHAEL W. ROBINSON, P.E., P.L.S.
ENGINEERING AND SURVEYING
KILL DEVIL HILLS, N.C. 27948
COMPLIANCE WELL DATA
REVISIONS
KDHWWTP
KILL DEVIL HILLS
DARE COUNTY
NORTH CAROLINA
WASTEWATER DISPOSAL SYSTEM OVERVIEW
DATE: 07/27/06
SCALE: 1"=120'
DESIGNED: MWR
DRAWN: MWR
CHECKED: MWR
APPROVED: MWR
SHEET 17E OF 28
CAD FILE: 3825-17E
PROJECT NO. 3825