Large Community On-Site System Optimizes Development in North Carolina

NOWRA 2021 Onsite Wastewater

Mega Conference

By

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Disclaimer

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Case Study – Background

- First Time Developer: no experience in development.
- Original Site Engineer: little understanding of community on-site systems.
- Community Farm Concept.
- Conservation Subdivision with +50% open space
- Relatively small lots with majority of development open space.
- In more rural area of county.

We Became Part of the Original Team Late in the Process

- We were brought to the Team at the request of the Soil Scientist who did not have confidence in Site Engineer with respect to on-site systems.
- Site Engineer had already developed and gotten approvals for site plan.
- No consideration for suitability of soils nor how much area would be required for drain fields.
- Soils work was not completed.
- Only responsible for water and wastewater systems.

Problems with Original Site Plan

- Houses/Roads/Farm Area Located in Better Soils.
- Areas designated for Drain Fields were arbitrary.
- Not enough Drainfield Area to Support development.
- Drip Lines running up gradient, not on contour.
- Subdivision laid out as if it was on municipal sewer.
- NCDOT roads with curb and gutter which were not in line with price point of homes.
- Wastewater Collection System had to be routed around Stormwater and Other Structures.

SITE DATA SUMMARY

ADJUSTED GROSS SITE AREA: 287.723 AC
ZONING: RR, M/LR-A
DENSITY ALLOWED: 0.500 DU/AC
PROPOSED DENSITY: 0.500 DU/AC
PROPOSED LOTS: 141
1 EXISTING HOUSE ON PID: 188062
1 PROPOSED FARM RESIDENT
TOTAL SF UNITS: 143
MINIMUM LOT WIDTH: 50'
MINIMUM LOT SIZE 4613 SQ FT
HOUSING TYPE: SINGLE FAMILY DETACHED
MAX BUILDING HEIGHT: 35'
MAX ALLOWABLE IMPERVIOUS SURFACE: 17.26 AC (6%)
PROPOSED IMPERVIOUS SURFACE: 17.26 AC (6%)

GENERAL NOTES

1. WHITE SPACE ON PLAN REPRESENTS EITHER LOTS, UTILITY EASEMENTS, POWER LINE EASEMENTS OR ROADS.
2. THERE ARE NO TRANSIT ACCOMMODATIONS PROPOSED.
3. THE SITE SHALL USE COMMUNITY WELL AND SEPTIC. A MSUP IS REQUIRED.
4. SEWER EASEMENTS ARE TO BE LOCATED IN OPEN SPACE.
5. THERE ARE NO ADOPTED MASTER PLANS FOR BICYCLE CIRCULATION SYSTEMS IN THE VICINITY OF THIS PROJECT.
6. AREA OF STREAM BUFFERS, AND OTHER AREAS THROUGHOUT DEVELOPMENT THAT IS NOT CONTAINED WITHIN A SINGLE FAMILY PARCEL SHALL BE OWNED AND MAINTAINED BY HOME OWNERS ASSOCIATION.
7. EXISTING REGISTERED FARM BOUNDARY TO BE MODIFIED TO INCLUDE AREA SHOWN ON PLANS. ALL IMPERVIOUS SURFACES WITHIN THE PROPOSED REVISED REGISTERED FARM AREA HAVE BEEN EXCLUDED FROM IMPERVIOUS CALCULATIONS.

LOT LEGEND

- TYPE 1 LOT (69 TOTAL)
- TYPE 2 LOT (36 TOTAL)
- TYPE 3 LOT (26 TOTAL)
- TYPE 4 LOT (10 TOTAL)

PARKING CALCULATIONS:

SINGLE FAMILY LOT PARKING:
PARKING SPACES REQUIRED: 2 SPACES PER SINGLE FAMILY LOT (143 LOTS)
PARKING SPACES PROVIDED: 286 SPACES (2 SPACES INTERNAL / SINGLE FAMILY LOT)

CLUBHOUSE PARKING:
PARKING SPACES REQUIRED: 1 SPACE / 100 SF FOR 2200 SF CLUBHOUSE = 22 SPACES
PARKING SPACES PROVIDED: 22 SPACES

HANDICAP ACCESSIBLE PARKING SPACES REQUIRED: 1 SPACE
HANDICAP ACCESSIBLE PARKING SPACES PROVIDED: 1 SPACE

BIKE PARKING SPACES REQUIRED: 10% OF TOTAL SPACES WITH A MIN.OF 4 SPACES
BIKE PARKING SPACES PROVIDED: 8 SPACES

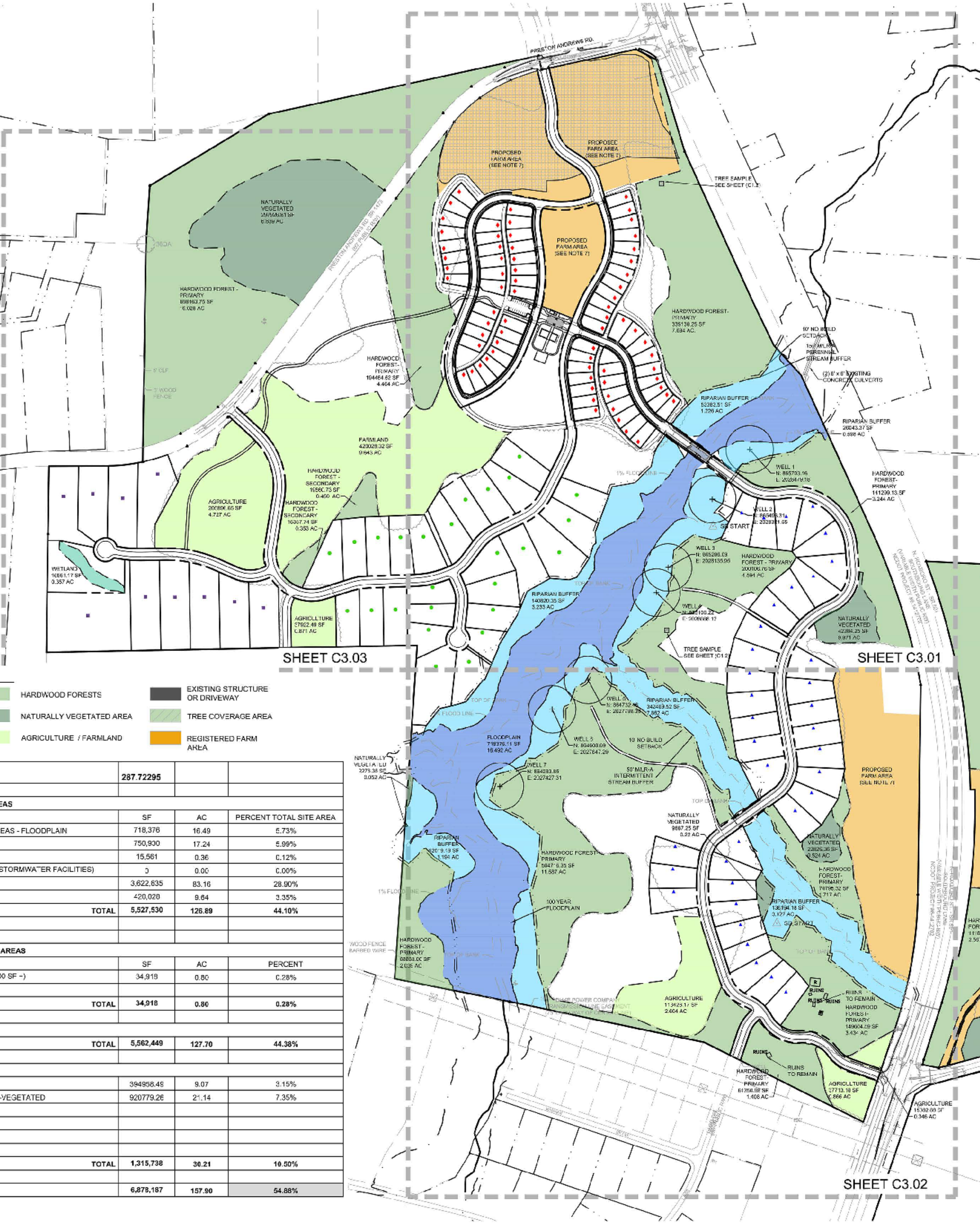
LEGEND:

EXISTING CONTOURS (10' INTERVAL)
EXISTING CONTOURS (2' INTERVAL)
PROPERTY LINE/PROJECT SITE
RIGHT OF WAY
PARCEL LINES
OS — OPEN SPACE
M/LR-A STREAM BUFFER
BUILDING SETBACK
STREAM
FWG — FLOODWAY FRINGE
FW — FLOODWAY
OU — OVERHEAD UTILITY
W — WETLANDS
EXISTING TREELINE,
FENCE
SWALE
SPECIMEN TREE
EXISTING IRON PIPE
PROPERTY CORNER
EXISTING ANGLE IRON
R/W MONUMENT

IMPERVIOUS CALCULATIONS

TYPE	Number of Lots	Buildable Area	Max Impervious	TOTAL IMPERVIOUS (SF)	TOTAL IMPERVIOUS (AC)	% BASED ON GROSS AC
TYPE 1 LOT	69	52x40	1870	129030	2.96	1.03%
TYPE 2 LOT	36	85x142	2800	100800	2.31	0.80%
TYPE 3 LOT	26	90x192	3400	88400	2.03	0.71%
TYPE 4 LOT	10	140x217	4250	42500	0.98	0.34%
ROADWAY				355404	8.16	2.84%
SIDEWALK				30873	0.71	0.25%
AMENITY				4952	0.11	0.04%
POST DEVELOPMENT PERCENT IMPERVIOUS				751959.3632	17.26	**6.00%**

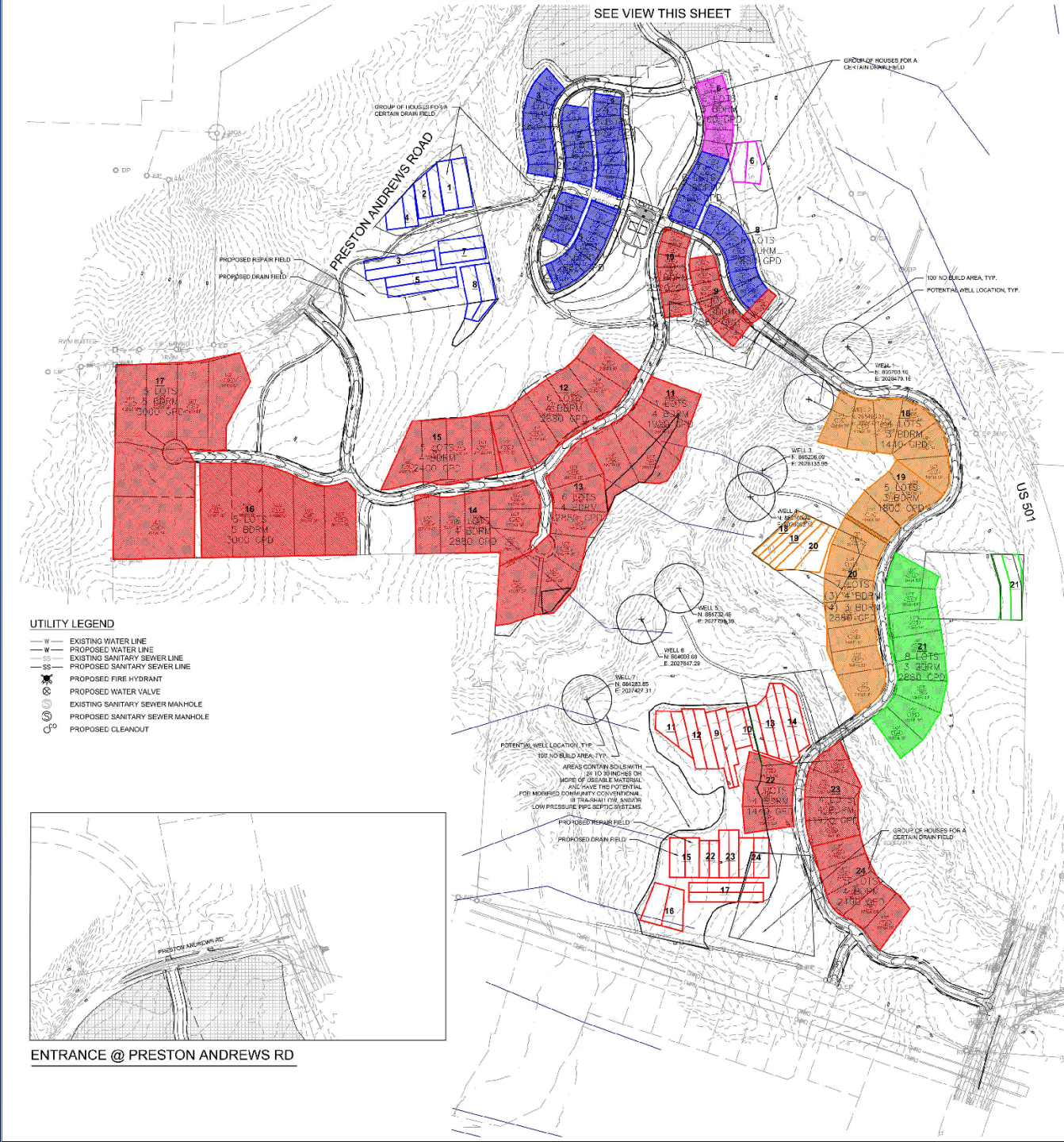
NOTE: EXISTING IMPERVIOUS SURFACE WAS EXCLUDED FROM CALCULATIONS. ALL EXISTING IMPERVIOUS AREA IS WITHIN THE BOUNDS OF A REGISTERED FARM AND THEREFORE EXEMPT FROM IMPERVIOUS CALCULATIONS.



OPEN SPACE LEGEND:

RIPARIAN BUFFER	HARDWOOD FORESTS	EXISTING STRUCTURE OR DRIVEWAY
FLOODPLAIN	NATURALLY VEGETATED AREA	TREE COVERAGE AREA
FLOODPLAIN	AGRICULTURE / FARMLAND	REGISTERED FARM AREA

TOTAL SITE ACREAGE		**287.72295**		
PRIMARY CONSERVATION OPEN SPACE AREAS				
	TYPE	SF	AC	PERCENT TOTAL SITE AREA
	A - SPECIAL FLOOD HAZARD AREAS - FLOODPLAIN	718,376	16.49	5.73%
	B - RIPARIAN BUFFERS	750,930	17.24	5.99%
	C - USACOE WETLANDS	15,561	0.36	0.12%
	D - LAKES, PONDS(EXCLUDING STORMWATER FACILITIES)	0	0.00	0.00%
	F - HARDWOOD FORESTS 1AC+	3,622,635	83.16	28.90%
	L - FARMLAND	420,028	9.64	3.35%
	TOTAL	**5,527,530**	**126.89**	**44.10%**
SECONDARY CONSERVATION OPEN SPACE AREAS				
	TYPE	SF	AC	PERCENT
	A - HARDWOOD FORESTS (12,000 SF +)	34,918	0.80	0.28%
	TOTAL	**34,918**	**0.80**	**0.28%**
TOTAL CONSERVATION OPEN SPACE				
	TOTAL	**5,562,449**	**127.70**	**44.38%**
OTHER OPEN SPACE AREAS				
	A - AGRICULTURAL LAND	394958.49	9.07	3.15%
	B - NATURALLY VEGETATED/RE-VEGETATED	920779.26	21.14	7.35%
	TOTAL	**1,315,738**	**30.21**	**10.50%**
TOTAL PROPOSED OPEN SPACE AREA		**6,878,187**	**157.90**	**54.88%**



UTILITY LEGEND

- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SANITARY SEWER LINE
- PROPOSED SANITARY SEWER LINE
- PROPOSED FIRE HYDRANT
- PROPOSED WATER VALVE
- EXISTING SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED CLEANOUT

ENTRANCE @ PRESTON ANDREWS RD

WATER SYSTEM NOTES:

1. COMMUNITY WATER SHALL BE PROVIDED BY A COMMUNITY WELL SYSTEM APPROVED BY THE STATE OF NORTH CAROLINA.
2. THE WELLS SHOWN ON THIS PLAN HAVE BEEN PRELIMINARY TESTED AND ARE PROPOSED AS THE SOURCE FOR WATER DISTRIBUTION ONSITE. AT THE TIME OF CONSTRUCTION DRAWINGS FULL DETAILS WILL BE PROVIDED FOR THE TREATMENT AND DISTRIBUTION OF WATER FROM THE PROPOSED WELLS TO EACH HOUSE.
3. THE PROPOSED WELLS SHALL HAVE A 100' NO BUILD BUFFER PROVIDED AROUND EACH PROPOSED WELL LOCATION.
4. THE CONTRACTOR SHALL COORDINATE THE CONSTRUCTION OF UNDERGROUND UTILITIES (WATER, SEWER, STORM, ELECTRICAL, GAS, OR OTHER) FOR THIS PROJECT WITH THE BUILDING PLANS. THE UTILITY CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE INSTALLATION OF ALL UTILITY SERVICES TO WITHIN FIVE (5) FEET OF THE BUILDING CONNECTION POINT.
5. ELEVATIONS AND UTILITIES ARE GIVEN TO THE EXTENT OF INFORMATION AVAILABLE. WHERE ELEVATIONS ARE NOT GIVEN AT POINTS OF EXISTING UTILITY CROSSINGS, SUCH ELEVATIONS SHALL BE DETERMINED BY THE CONTRACTOR AND REPORTED TO THE ENGINEER. WHEN UNKNOWN LINES ARE EXPOSED, THEIR LOCATIONS AND ELEVATIONS SHALL ALSO BE REPORTED TO THE ENGINEER.

WASTEWATER SYSTEM NOTES:

1. COMMUNITY WASTEWATER SHALL BE PROVIDED BY GROUPED COMMUNITY DRAIN FIELD SYSTEMS. ALL WASTEWATER IMPROVEMENTS SHALL MEET COUNTY OF DURHAM ENVIRONMENTAL HEALTH REQUIREMENTS.
2. THE PROPOSED LOTS HAVE BEEN GROUPED AND LABELED INTO SEVERAL WASTEWATER SYSTEM. EACH PROPOSED SYSTEM WILL CONTAIN A GRAVITY CONVEYANCE FROM THE PROPOSED LOTS TO A SEPTIC TANK, THAT WILL THEN BE PUMPED THROUGH A TREATMENT SYSTEM, PRIOR TO BE PUMPED TO A DOSING TANK FOR EACH FIELD. THE PROPOSED GROUPED LOTS AND DRAIN FIELD LOCATIONS HAVE BEEN SHOWN ON THIS PLAN AND THE DETAILS OF THE PUMPS, LINES, TREATMENT, TANKS AND FIELDS WILL BE PROVIDED IN THE CONSTRUCTION DOCUMENTS.
3. EACH LOTS HAS SEVERAL BEDROOMS, REFER TO THE PLAN FOR THE NUMBER OF BEDROOMS FOR EACH LOT. THE CALCULATION OF EXPECTED GALLONS PER DAY IS BASED ON 120 GPD PER BEDROOM.
4. THE PROPOSED LOCATION OF THE DRAIN AND REPAIR FIELDS IS BASED ON A REPORT FROM THE SOIL AND LAND CONSULTANT DON WELLS.
5. A REPAIR FIELD OF THE SAME SIZE IS PROPOSED WITH EACH DRAIN FIELD, REFER TO THE PLAN FOR PROPOSED LOCATIONS.
6. THE CONTRACTOR SHALL COORDINATE THE CONSTRUCTION OF UNDERGROUND UTILITIES (WATER, SEWER, STORM, ELECTRICAL, GAS, OR OTHER) FOR THIS PROJECT WITH THE BUILDING PLANS. THE UTILITY CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE INSTALLATION OF ALL UTILITY SERVICES TO WITHIN FIVE (5) FEET OF THE BUILDING CONNECTION POINT.
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PROPOSED UTILITY SEPARATION

1. WATER MAINS SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM EXISTING OR PROPOSED SEWERS, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT A 10-FOOT HORIZONTAL SEPARATION IN WHICH CASE:
   - 1.A. THE WATER MAIN IS LAID IN A SEPARATE TRENCH, WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER; OR
   - 1.E. THE WATER MAIN IS LAID IN THE SAME TRENCH AS THE SEWER WITH THE WATER MAIN LOCATED AT ONE SIDE OF A BENCH OF UNDISTURBED EARTH, AND WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP TO THE SEWER.
2. CROSSING A WATER MAIN OVER A SEWER. WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS OVER A SEWER, THE WATER MAIN SHALL BE LAID AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER, UNLESS LOCAL CONDITIONS OR BARRIERS PREVENT AN 18 INCH VERTICAL SEPARATION, IN WHICH CASE BOTH THE WATER MAIN AND SEWER SHALL BE CONSTRUCTED OF FERROUS MATERIALS AND WITH JOINTS THAT ARE EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING.
3. CROSSING A WATER MAIN UNDER A SEWER. WHENEVER IT IS NECESSARY FOR A WATER MAIN TO CROSS UNDER A SEWER, BOTH THE WATER MAIN AND THE SEWER SHALL BE CONSTRUCTED OF FERROUS MATERIALS AND WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE POINT OF CROSSING. A SECTION OF WATER MAIN PIPE SHALL BE CENTERED AT THE POINT OF CROSSING.

SEPARATION OF SANITARY SEWERS AND STORM SEWERS

1. A 24" VERTICAL SEPARATION SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER LINES OR BOTH THE SANITARY AND THE STORM LINES SHALL BE CONSTRUCTED OF FERROUS MATERIALS.

Wastewater System Design Components

- Collection System: Modified STEP System with multiple lots on one offsite STEP tank.
- Wastewater Treatment System: Recirculating Media Filter with UV-Disinfection, proprietary system.
- Effluent Disposal: Subsurface Drip Irrigation.

Wastewater System Design Criteria

Criteria	Influent	Permit Effluent	Design Effluent
3-4 Bedroom Homes	141		
ADF GPD	60,960		
Adjusted ADF (75%)	45,720		
BOD_5 (mg/l)	250	30.0	15.0
TSS (mg/l)	250	30.0	15.0
Ammonia (mg/l)	25.0		1.00
Nitrate/Nitrite (mg/l)	0.00	13.0	12.3
Total N (mg/l)	40.0	14.0	13.3
Total P (mg/l)	11.0		8.9
Fecal Coliforms (G.M #/200ml)	10^10	200	10

Collection System: Modified STEP System

- Private 6-inch collection sewer with cleanouts in lieu of manholes
- Allows for a couple of emergency generators to be cycled in an emergency.
- Ensures proper O&M contracted through HOA.
- Works well with topography.
- No tanks on lots.
- Reduces O&M with respect to pumping and pump replacement.


DOOSAN

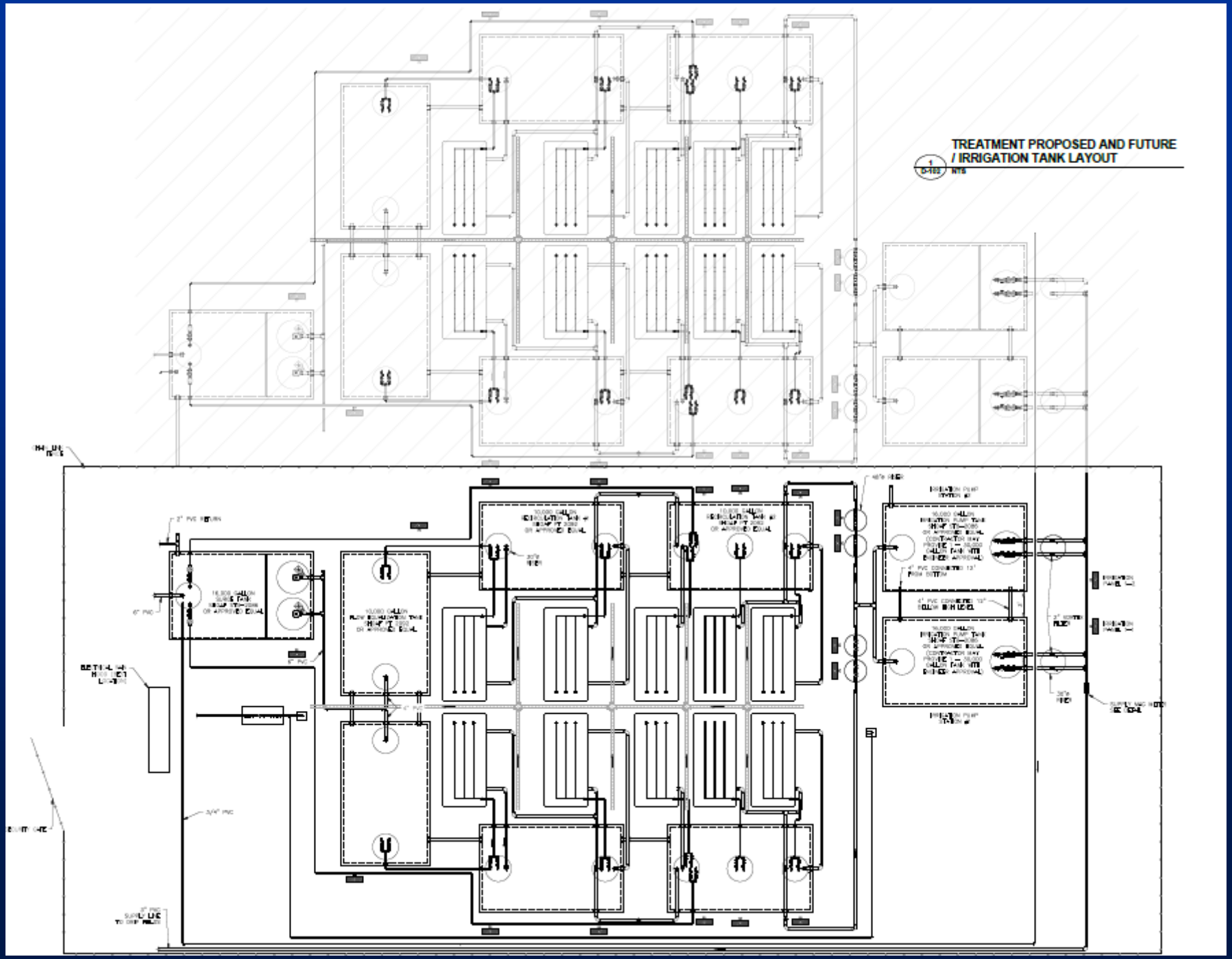

DOOSAN

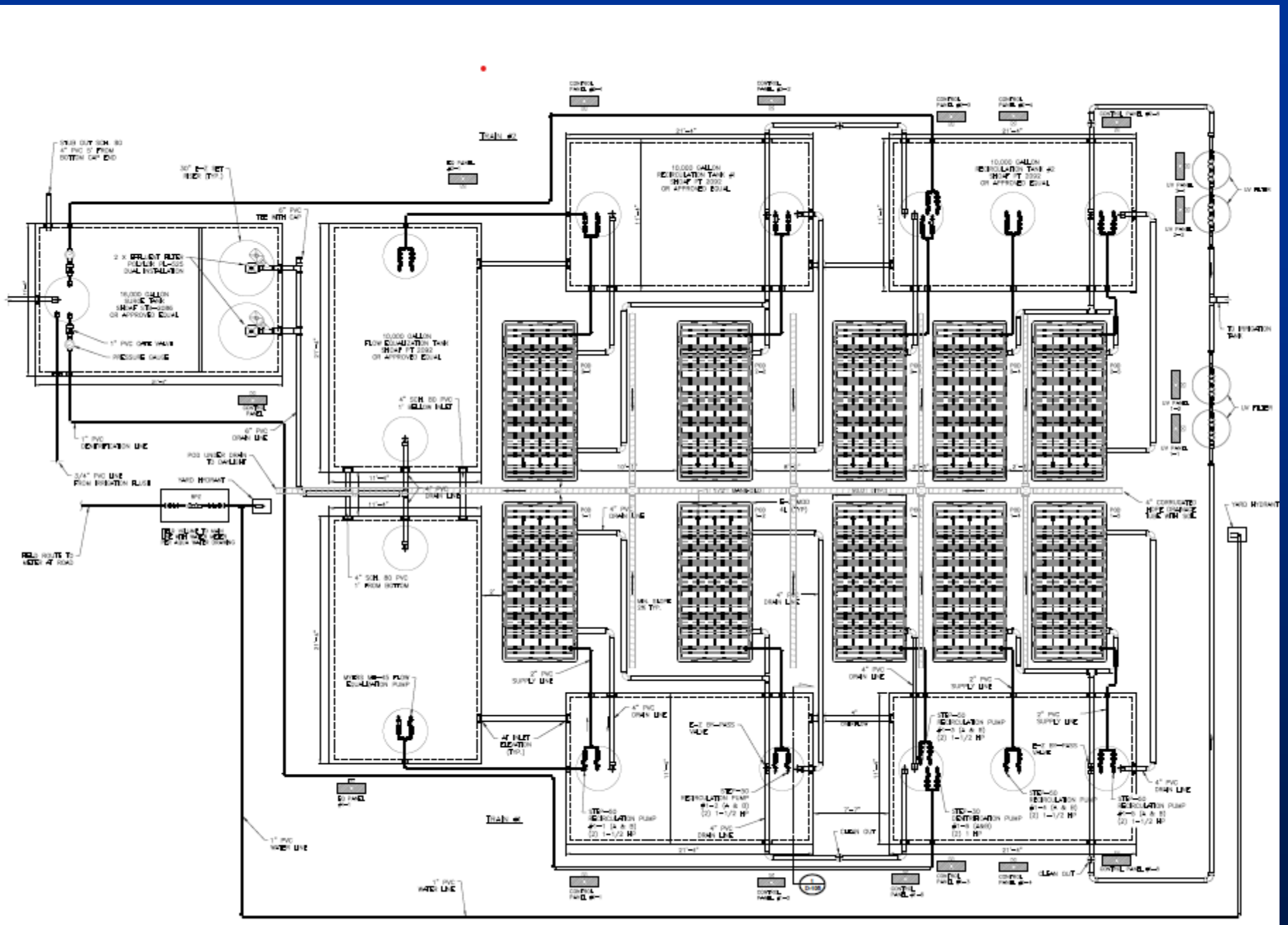
Wastewater Treatment System: Recirculating Media Filter

- Technology based on recirculating sand filter.
- Uniform plastic media.
- Only moving parts are pumps.
- UV Disinfection.
- Simple to operate and maintain.
- Expandable, can be phased.
- Reuse quality with nutrient removal (Certified: NSF 40, 245, and 350), although not required for permit.

Standards NSF / ANSI

Test	NSF/ANSI 40	NSF/ANSI 245	NSF/ANSI 350
	Domestic	Nutrient	Reuse
CBOD 5-Day	25 mg/l		10 mg/l
TSS	30 mg/l		10 mg/l
Nitrogen Reduction		50 % Reduction	
Turbidity			5 NTU
Bacteria (e-coli)			14 CFU/100ml
Chlorine Residual			0.5 - 2.5 mg/l
pH	6 - 9		6 - 9


TREATMENT PROPOSED AND FUTURE
/ IRRIGATION TANK LAYOUT
1
D-102
NTS



1 D-103 SEPTIC, RECIRCULATION, AND FIELD FLOW EQUALIZATION TANKS (PLAN)
NTS


ADDITIONAL
PARTS INSIDE


DO NOT TOP LOAD!
ConSeal
CONCRETE SEALANTS

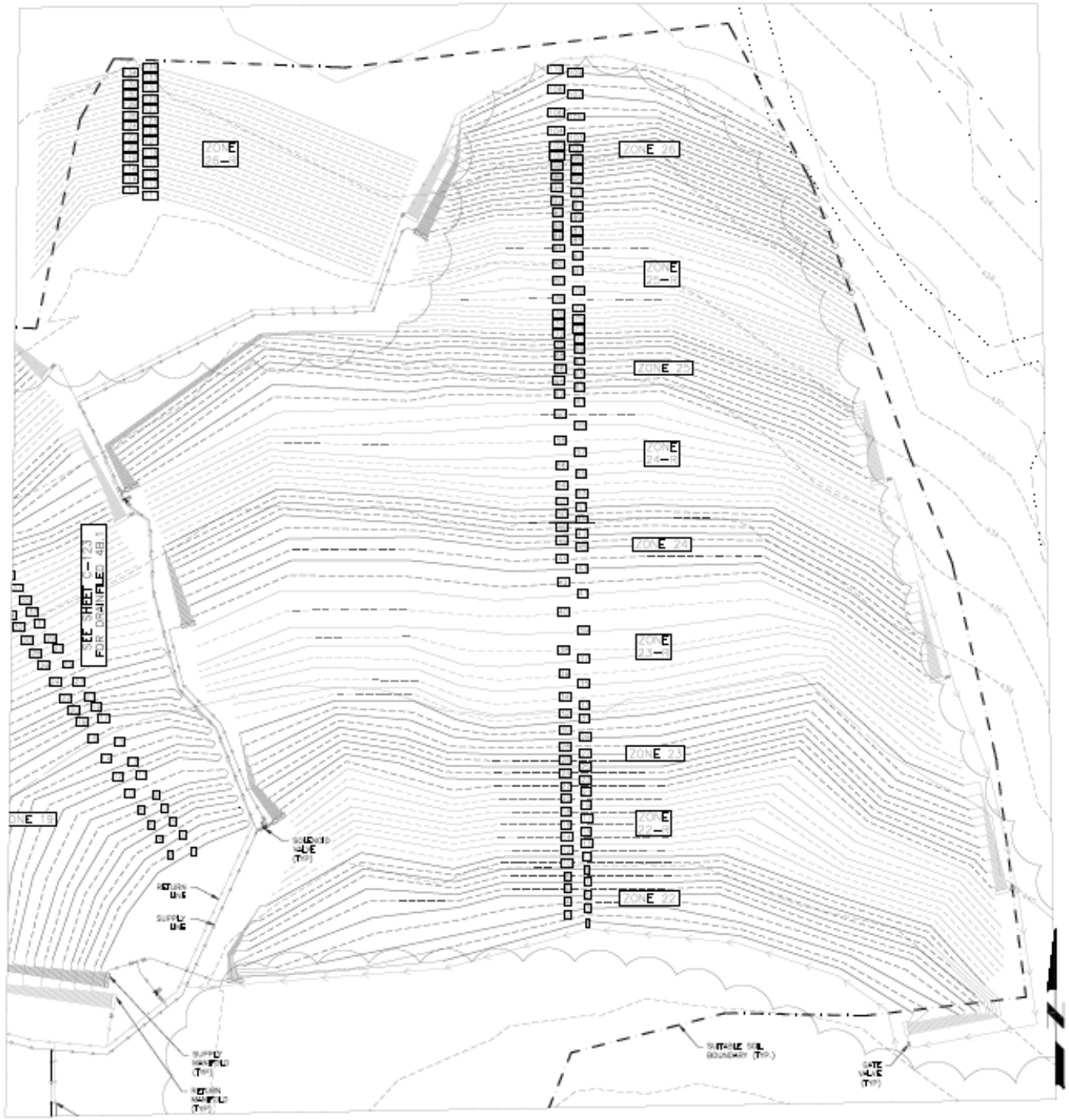

BURGER


DOOSAN
DTS


DX350
YANMAR

Effluent Disposal: Subsurface Drip Irrigation

- Aesthetically pleasing.
- Fencing not required.
- Many zones with ability to modify dosing regimes.
- Dosing based on soils, lateral flow, and modeling.
- Forests and open Fields.
- Alternate initial and repair fields.

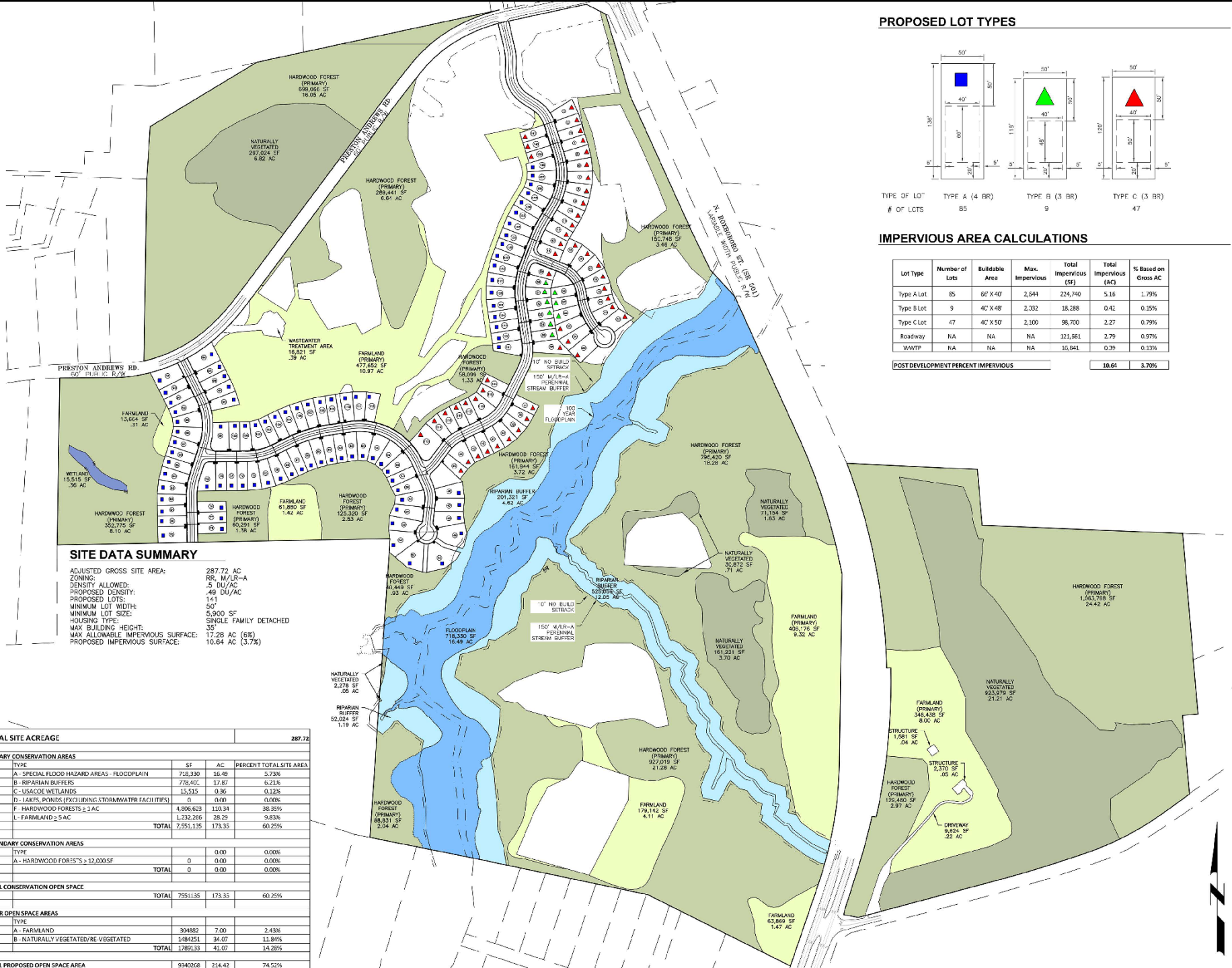

ZONE 26
ZONE 25
ZONE 24
ZONE 23
ZONE 22
ZONE 21
SEE SHEET L-123 FOR DRAINAGE
SUPPLY MANIFOLD (TYP.)
RETURN MANIFOLD (TYP.)
SUITABLE SOIL BOUNDARY (TYP.)
GATE VALVE (TYP.)

Engineer Option Permit

- Engineer, Soil Scientist, and Installer take liability through Insurance.
- County and State have No Liability.
- Local Health Department only evaluates for completeness, no detailed review.
- Permit issued within 15 days or deemed permitted.

Revised Project

- Development on one side of creek.
- Same number of homes.
- Use better soils for drain fields.
- Do away with “Community Farm Concept”.
- Keep Conservation Subdivision.
- Save as much infrastructure as possible.
- New portions use swales in lieu of curb and gutter.
- All drain fields on site.



SITE DATA SUMMARY

ADJUSTED GROSS SITE AREA:	287.72 AC
ZONING:	RR, M/LR-A
DENSITY ALLOWED:	.5 DU/AC
PROPOSED DENSITY:	.49 DU/AC
PROPOSED LOTS:	141
MINIMUM LOT WIDTH:	50'
MINIMUM LOT SIZE:	5,900 SF
HOUSING TYPE:	SINGLE FAMILY DETACHED
MAX BUILDING HEIGHT:	35'
MAX ALLOWABLE IMPERVIOUS SURFACE:	17.28 AC (6%)
PROPOSED IMPERVIOUS SURFACE:	10.64 AC (3.7%)

TOTAL SITE ACREAGE				287.72
PRIMARY CONSERVATION AREAS				
	TYPE	SF	AC.	PERCENT TOTAL SITE AREA
	A - SPECIAL FLOOD HAZARD AREAS - FLOODPLAIN	718,330	16.49	5.73%
	B - RIPARIAN BUFFERS	778,40[illegible]	17.87	6.21%
	C - USACOE WETLANDS	15,515	0.36	0.12%
	D - LAKES, PONDS (EXCLUDING STORMWATER FACILITIES)	0	0.00	0.00%
	F - HARDWOOD FORESTS ≥ 1 AC	4,806,623	110.34	38.35%
	L - FARMLAND ≥ 5 AC	1,232,266	28.29	9.83%
	TOTAL	7,551,135	173.35	60.25%
SECONDARY CONSERVATION AREAS				
	TYPE		0.00	0.00%
	A - HARDWOOD FORESTS ≥ 12,000 SF	0	0.00	0.00%
	TOTAL	0	0.00	0.00%
TOTAL CONSERVATION OPEN SPACE				
	TOTAL	7551135	173.35	60.25%
OTHER OPEN SPACE AREAS				
	TYPE			
	A - FARMLAND	304882	7.00	2.43%
	B - NATURALLY VEGETATED/RE-VEGETATED	1484251	34.07	11.84%
	TOTAL	1789133	41.07	14.28%
TOTAL PROPOSED OPEN SPACE AREA		9340268	214.42	74.52%

PROPOSED LOT TYPES

TYPE OF LOT	TYPE A (4 BR)	TYPE B (3 BR)	TYPE C (3 BR)
# OF LOTS	85	9	47

IMPERVIOUS AREA CALCULATIONS

Lot Type	Number of Lots	Buildable Area	Max. Impervious	Total Impervious (SF)	Total Impervious (AC)	% Based on Gross AC
Type A Lot	85	66' X 40'	2,644	224,740	5.16	1.79%
Type B Lot	9	40' X 48'	2,332	18,288	0.42	0.15%
Type C Lot	47	40' X 50'	2,100	98,700	2.27	0.79%
Roadway	NA	NA	NA	121,561	2.79	0.97%
WWTP	NA	NA	NA	16,841	0.39	0.13%
POST DEVELOPMENT PERCENT IMPERVIOUS					10.64	3.70%

WATER SYSTEM NOTES

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2. THE WELLS SHOWN ON THIS PLAN HAVE BEEN PRELIMINARY TESTED AND ARE PROPOSED AS THE SOURCE FOR WATER DISTRIBUTION ONSITE. AT THE TIME OF CONSTRUCTION DRAWINGS, FULL DETAILS WILL BE PROVIDED FOR THE TREATMENT AND DISTRIBUTION OF WATER FROM THE PROPOSED WELLS TO EACH HOUSE.
3. THE EXISTING WELLS SHALL HAVE A 100' NO BUILD SETBACK PROVIDED AROUND EACH LOCATION.
4. THE CONTRACTOR SHALL COORDINATE THE CONSTRUCTION OF UNDERGROUND UTILITIES (WATER, SEWER, STORM, ELECTRICAL, GAS OR OTHER). THE UTILITY CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE INSTALLATION OF ALL UTILITY SERVICES TO THE EDGE OF THE RIGHT-OF-WAY.
5. ELEVATIONS AND UTILITIES ARE GIVEN TO THE EXTENT OF INFORMATION AVAILABLE. WHERE ELEVATIONS ARE NOT GIVEN AT POINTS OF EXISTING UTILITY CROSSINGS, SUCH ELEVATIONS SHALL BE DETERMINED BY THE CONTRACTOR AND REPORTED TO THE ENGINEER. WHEN UNKNOWN LINES ARE EXPOSED, THEIR LOCATIONS AND ELEVATIONS SHALL ALSO BE REPORTED TO THE ENGINEER.
6. CONTRACTOR MAY REPURPOSE EXISTING METERS AND APPURTENANCES TO NEW LOCATION.

WASTEWATER SYSTEM NOTES

1. COMMUNITY WASTEWATER SHALL BE PROVIDED BY A COMMUNITY DRAINFIELD SYSTEM. ALL WASTEWATER IMPROVEMENTS SHALL MEET COUNTY OF DURHAM ENVIRONMENTAL HEALTH REQUIREMENTS.
2. THE PROPOSED LOTS HAVE BEEN GROUPED INTO SEVERAL COLLECTION SYSTEMS. EACH COLLECTION SYSTEM WILL CONTAIN A GRAVITY CONVERGENCE FROM THE PROPOSED LOT TO A SEPTIC/PUMP TANK THAT WILL THEN PUMP THE WASTE TO A CENTRALIZED TREATMENT SYSTEM. THE TREATED EFFLUENT WILL THEN BE PUMPED TO VARIOUS DRAINFIELDS THROUGHOUT THE SITE. THE DETAILS OF THE PUMPS, LINES TREATMENT, TANKS, AND FIELDS WILL BE PROVIDED IN THE CONSTRUCTION DOCUMENTS.
3. EACH LOT HAS 3-4 BEDROOMS. REFER TO THE PLAN FOR THE NUMBER OF BEDROOMS FOR EACH LOT. THE CALCULATION OF EXPECTED GALLONS PER DAY IS BASED ON 120 GPD PER BEDROOM. THE DRAINFIELD IS SIZED BASED ON 90 GPD PER BEDROOM (PER APPROVED 25% FLOW REDUCTION).
4. THE PROPOSED LOCATION OF INITIAL AND REPAIR DRAINFIELDS IS BASED ON REPORTS BY DON WELLS L.S.S. OF S&EG.
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   1.1. THE WATER MAIN IS LAID IN A SEPARATE TRENCH, WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER; OR
   1.2. THE WATER MAIN IS LAID IN THE SAME TRENCH AS THE SEWER WITH THE WATER MAIN LOCATED AT ONE SIDE OF A BENCH OF UNDISTURBED EARTH AND WITH THE ELEVATION OF THE BOTTOM OF THE WATER MAIN AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER.
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SEPARATION OF SANITARY SEWERS AND STORM SEWERS

1. A 24" VERTICAL SEPARTION SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER LINES OR BOTH THE SANITARY AND THE STORM LINES SHALL BE CONSTRUCTED OF FERROUS MATERIALS.
2. AN 8' HORIZONTAL SEPARATION SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER LINES.

Lessons Learned

- Experience matters.
- With large community on-site systems soils dictate design.
- Modified STEP systems provide benefits and cost savings.
- Recirculating media filters with drip irrigation are a good option for community systems.

Questions?

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