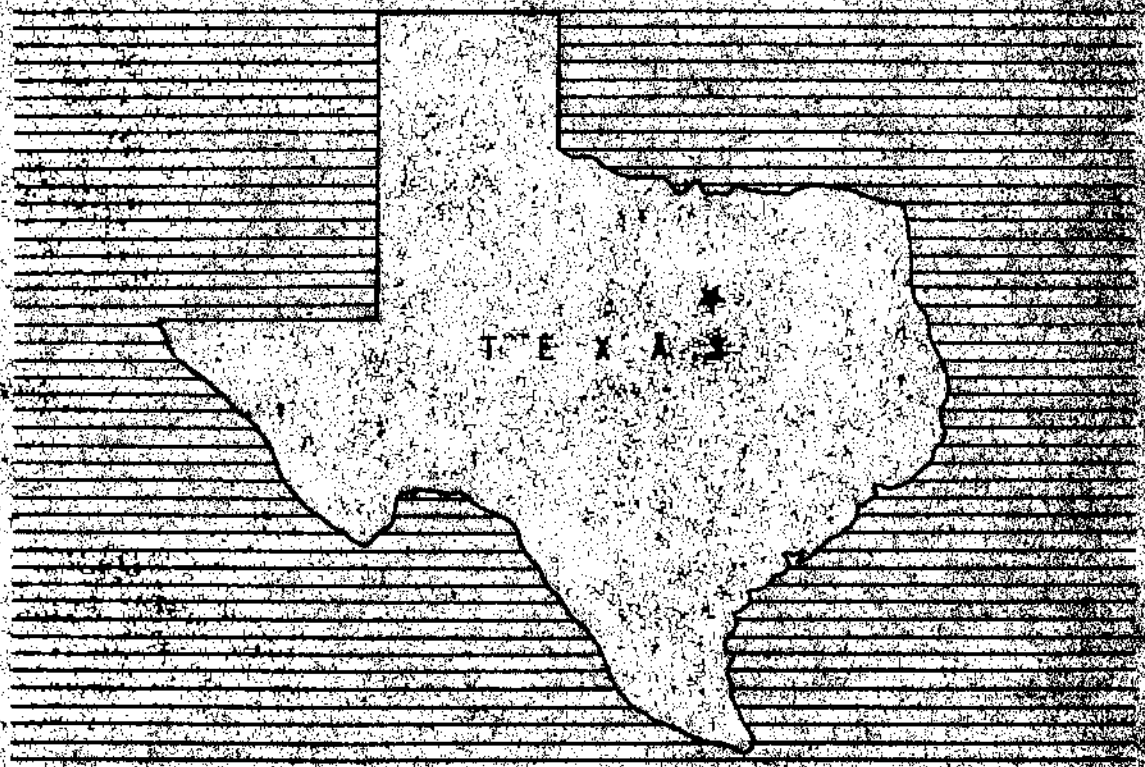
SUPPLEMENTAL
WATERSHED WORK PLAN NO. II
FOR
WATERSHED PROTECTION AND FLOOD PREVENTION

AQUILLA-HACKBERRY CREEK WATERSHED

HILL AND JOHNSON COUNTIES, TEXAS



SEPTEMBER 1972

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SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NO. II

Between the

Aquilla-Hackberry Creek Conservation District
Local Organization

Hill County-Blackland Soil and Water Conservation District
Local Organization

Johnson County Soil and Water Conservation District
Local Organization

Hill County Commissioners Court
Local Organization

State of Texas
(hereinafter referred to as the Sponsoring Local Organization)

and the

Soil Conservation Service
United States Department of Agriculture
(hereinafter referred to as the Service)

Whereas, the Watershed Work Plan Agreement for the Aquilla-Hackberry Creek Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 1st day of April 1969; and

Whereas, the supplemental watershed work plan agreement for the Aquilla-Hackberry Creek watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 12th day of January 1972; and

Whereas, in order to carry out the watershed work plan, as supplemented, for subject watershed, it has become necessary to modify said Watershed Work Plan Agreement, as supplemented; and

Whereas, it has become necessary to modify the watershed work plan as supplemented to delete nine grade stabilization structures, relocate one grade stabilization structure, redesign one grade stabilization structure, and add two grade stabilization structures; and

Whereas, a Supplemental Watershed Work Plan No. II for said watershed has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service; which plan is annexed to and made a part of this agreement

Now, therefore, the Sponsoring Local Organization and the Service hereby agree upon the following modifications of the terms, conditions, and stipulations of said Watershed Work Plan Agreement, as supplemented:

1. Paragraph numbered 3 is modified with respect to Grade Stabilization Structures to read as follows:

   The percentage of construction costs to be paid by the Sponsoring Local Organization and by the Service are as follows:

Works of Improvement	Sponsoring Local Organization (percent)	Service (percent)	Estimated Construction Cost (dollars)
20 Grade Stabilization Structures	-	100.00	182,500

2. Paragraph numbered 4 is modified with respect to Grade Stabilization Structures to read as follows:

   The percentages of the engineering costs to be borne by the Sponsoring Local Organization and the Service are as follows:

Works of Improvement	Sponsoring Local Organization (percent)	Service (percent)	Estimated Engineering Cost (dollars)
20 Grade Stabilization Structures	-	100.00	20,078

3. Paragraph numbered 6 is modified to read as follows:

   The Sponsoring Local Organization and the Service will each bear the costs of project administration which it incurs, estimated to be $16,400 and $359,968, respectively.

4. The Sponsoring Local Organization and the Service further agree to all other terms, conditions, and stipulations of said Watershed Work Plan Agreement, as supplemented, not modified herein.

Aquilla-Hackberry Creek Conservation District
Local Organization

By [signature]

Title Chairman

Address 818 E. Elm St., Hillsboro, Tex. 76645
Zip Code

Date 10/19/73

The signing of this agreement was authorized by a resolution of the governing body of the Aquilla-Hackberry Creek Conservation District
Local Organization

adopted at a meeting held on 10/19/73

[signature]
(Secretary, Local Organization)

Address Route 4, Hillsboro, Tex. 76645
Zip Code

Date 10/19/73

Hill County-Blackland Soil and Water Conservation District
Local Organization

By [signature]

Title Chairman

Address Route 1, Hillsboro, Texas 76645
Zip Code

Date 10/18/73

The signing of this agreement was authorized by a resolution of the governing body of the Hill County-Blackland Soil and Water Conservation District
Local Organization

adopted at a meeting held on 10/18/73

[signature]
(Secretary, Local Organization)

Address Route 1, Bynum, Texas 76631
Zip Code

Date 10/18/73

Johnson County Soil and Water Conservation District
Local Organization

By N P Singhuson

Title Chairman

Address Rt 4 Grandview Tex 76050
Zip Code

Date 11-6-73

The signing of this agreement was authorized by a resolution of the governing body of the Johnson County Soil and Water Conservation District
Local Organization

adopted at a meeting held on _____

Lloyd Martin
(Secretary, Local Organization)

Address Rt 2 Alvarado, Tex. 76009
Zip Code

Date 11-6-73

Hill County Commissioners Court
Local Organization

By [illegible]

Title County Judge

Address Box 457 Hillsboro, Texas 76645
Zip Code

Date October 24, 1973

The signing of this agreement was authorized by a resolution of the governing body of the Hill County Commissioners Court
Local Organization

adopted at a meeting held on Oct 24 - 1973

Glenn Morgan Co. Clerk
(Secretary, Local Organization)

Address Box 398 Hillsboro Texas
Zip Code 76645

Date Oct 24 - 1973

Soil Conservation Service
United States Department of Agriculture

By _____ Acting
(State Conservationist)

Date _____

SUPPLEMENTAL

WATERSHED WORK PLAN NO. II

FOR

WATERSHED PROTECTION AND FLOOD PREVENTION

AQUILLA-HACKBERRY CREEK WATERSHED
Hill and Johnson Counties, Texas

Prepared Under the Authority of the Watershed Protection and Flood Prevention Act, (Public Law 566, 83rd Congress, 68 Stat. 666), as amended.

Prepared by:

Aquilla-Hackberry Creek Conservation District

Hill County-Blackland Soil and Water Conservation District

Johnson County Soil and Water Conservation District

Hill County Commissioners Court

With Assistance by:

U. S. Department of Agriculture
Soil Conservation Service
September 1972

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SUPPLEMENTAL
WATERSHED WORK PLAN NO. II

AQUILLA-HACKBERRY CREEK WATERSHED
Hill and Johnson Counties, Texas
September 1972

PURPOSE OF THE SUPPLEMENTAL WORK PLAN

It has become necessary to modify the watershed work plan, as supplemented, for Aquilla-Hackberry Creek watershed to make the following changes:

1. Delete grade stabilization structures Nos. 11-1, 11-4, 11-5, 16-1, 20-2, 112, 113, 115, and 116.

2. Relocate grade stabilization structure No. 14-1 downstream about 600 feet and redesign grade stabilization structure No. 106.

3. Add grade stabilization structures Nos. 15-2 and 117.

Twenty-seven grade stabilization structures were included in the original work plan to stabilize active overfalls in order to achieve project objectives for application and maintenance of land treatment measures. Conditions have changed since the completion of the work plan and installation of grade stabilization structures is no longer required for successful application of land treatment measures on nine of the areas originally planned to have grade stabilization structures. Therefore, the structures that are no longer warranted are being deleted. Grade stabilization structure No. 14-1 was moved downstream to provide additional stable outlets for needed land treatment and grade stabilization structure No. 106 was redesigned in order to more effectively provide a stable outlet system for the planned land treatment measures. Grade stabilization structures Nos. 15-2 and 117 were added to provide a stable outlet so that needed land treatment measures could be applied on 165 acres and 78 acres, respectively, in the drainage areas above them.

The following are changes and modifications made in appropriate parts of the work plan as supplemented.

Watershed Problems

Drainage ways with active overfalls are contributing to the erosion problem by hindering application of conservation measures. As a result, about 3,923 acres of upland are subject to depreciation during the project evaluation period, and land voiding is occurring at the rate of about one acre per year. The revised average annual damage by land depreciation and voiding is estimated to be $15,261 on those areas evaluated.

Works of Improvement To Be Installed

The number of grade stabilization structures to be installed will change from 27 to 20. The location of the planned structural measures is shown on the project map (revised figure 5).

It is not anticipated that these changes will result in any changes in the number or type of displacements caused by the project. However, if other relocations become necessary, relocation payments will be cost-shared in accordance with the percentages shown in the supplemental work plan agreement (November 1971).

Explanation of Installation Costs

The total installation cost of structural measures is estimated to be $3,024,659. The Public Law 566 costs will be $2,532,553, and the local costs will be $492,106. The local costs consist of $469,105 for land rights, $6,601 for relocation payments, and $16,400 for project administration. Public Law 566 costs consist of $2,014,020 for construction, $152,126 for engineering services, $6,439 for relocation payments, and $359,968 for project administration.

Effects of Works of Improvement

The installation of the grade stabilization structures will provide outlets for waterways and terrace systems and will enable farm operators to apply and maintain needed land treatment measures on about 3,923 acres in the drainage areas above them. This will result in a more stable income for those operators and will conserve these lands for the use of future generations.

Project Benefits

The estimated average annual monetary damages (revised table 5) will be reduced from $173,537 to $39,289, or 77 percent. Future damages from land depreciation and voiding, with an equivalent value of $15,261, will be prevented.

Comparison of Benefits and Costs

The total average annual cost of structural measures (amortized total installation cost, plus operation and maintenance and other economic cost) is $114,928. These measures are expected to produce average annual benefits, excluding secondary benefits, of $172,695, resulting in a benefit-to-cost ratio of 1.5 to 1.0. The ratio of total average annual project benefits accruing to structural measures ($189,227) to the average annual cost of structural measures ($114,928) is 1.6 to 1.0.

Project Installation

The number of grade stabilization structures to be installed will change from 27 to 20.

Provisions for Operation and Maintenance

The estimated average annual value of operation, maintenance, and replacement is $12,046. This consists of $5,412 for floodwater retarding structures; $2,511 for channel work; and $4,123 for grade stabilization structures.

REVISED TABLE 1 - ESTIMATED PROJECT INSTALLATION COST
Aquilla-Hackberry Creek Watershed, Texas

Installation Cost Item	Unit	Number			Estimated Cost (Dollars) 1/		
		Federal Land	Non-Federal Land	Total	PL 566 Funds	Other	
					Non-Federal Land SCS 2/	Non-Federal Land SCS 2/	Total
LAND TREATMENT							
Land Areas 3/							
Cropland	Acres to be	-	23,279	23,279	-	581,000	581,000
Pastureland	treated	-	24,158	24,158	-	1,574,745	1,574,745
Technical Assistance					47,185	96,621	143,806
TOTAL LAND TREATMENT	xxx	xxx	xxx	xxx	47,185	2,252,366	2,299,551
STRUCTURAL MEASURES							
Construction							
Floodwater Retarding Structures	No.	-	23	23	1,641,200	-	1,641,200
Channel Work (N) 4/	Miles	-	15.6	15.6	190,300	-	190,300
Grade Stabilization Structures	No.	-	20	20	182,520	-	182,520
Subtotal - Construction					2,014,020	-	2,014,020
Engineering Services							
Floodwater Retarding Structures	No.	-	23	23	116,974	-	116,974
Channel Work	Miles	-	15.6	15.6	15,074	-	15,074
Grade Stabilization Structures	No.	-	20	20	20,078	-	20,078
Subtotal - Engineering Services					152,126	-	152,126
Relocation Payments					6,439	6,601	13,040
Project Administration							
Construction Inspection					180,978	3,100	184,078
Other					178,990	12,400	191,390
Relocation Assistance Advisory Services						900	900
Subtotal - Administration					359,968	16,400	376,368
Other Costa							
Land Rights					-	469,105	469,105
Subtotal - Other					-	469,105	469,105
TOTAL STRUCTURAL MEASURES					2,532,553	492,106	3,024,659
TOTAL PROJECT					2,579,738	2,744,472	5,324,210

1/ Price Base: 1972
2/ Federal agency responsible for assisting in installation of works of improvement
3/ Includes any areas estimated to be adequately treated during the project installation period. Treatment will be accelerated throughout the watershed, and dollar amounts apply to total land areas, not just to adequately treated areas.
4/ Type of channel before project: (N) - an unmodified well-defined natural channel or stream.

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REVISED TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION

Aquilla-Hackberry Creek Watershed, Texas

(Dollars)[1/]

Structure Site Number or Name	Installation Cost - Public Law 566 Funds				Installation Cost - Other Funds			Total Installation Cost
	Construction	Engineering	Relocation Payments[2/]	Total Public Law 566	Relocation Payments[2/]	Land Rights	Total Other	
Floodwater Retarding Structures 1 - 23	1,641,200	116,974	6,439	1,764,613	6,601	410,395	416,996	2,181,609
Channel Work	190,300	15,074	-	205,374	-	36,450	36,450	241,824
Grade Stabilization Structures								
11-2	10,560	1,162	-	11,722	-	1,670	1,670	13,392
11-3	8,690	956	-	9,646	-	1,190	1,190	10,836
14-1	13,400	1,474	-	14,874	-	2,200	2,200	17,074
14-2	7,700	847	-	8,547	-	1,110	1,110	9,657
15-1	11,660	1,283	-	12,943	-	1,350	1,350	14,293
15-2	7,200	792	-	7,992	-	490	490	8,482
20-1	16,500	1,815	-	18,315	-	1,510	1,510	19,825
101	8,250	908	-	9,158	-	940	940	10,098
102	10,120	1,113	-	11,233	-	1,350	1,350	12,583
103	8,800	968	-	9,768	-	1,270	1,270	11,038
104	8,470	932	-	9,402	-	780	780	10,182
105	10,230	1,125	-	11,355	-	1,430	1,430	12,785
106	11,300	1,243	-	12,543	-	1,390	1,390	13,933
107	8,800	968	-	9,768	-	940	940	10,708
108	8,580	944	-	9,524	-	1,110	1,110	10,634
109	6,820	750	-	7,570	-	780	780	8,350
110	6,930	762	-	7,692	-	780	780	8,472
111	7,370	811	-	8,181	-	940	940	9,121
114	5,940	653	-	6,593	-	780	780	7,373
117	5,200	572	-	5,772	-	250	250	6,022
Subtotal	182,520	20,078	-	202,598	-	22,260	22,260	224,858

(See footnotes at end of table)

REVISED TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION - continued
Aquilla-Hackberry Creek Watershed, Texas
(Dollars)[1/]

Structure Site Number or Name	Installation Cost - Public Law 566 Funds				Installation Cost - Other Funds			Total Installation Cost
	Construction	Engineering	Relocation Payments[2/]	Total Public Law 566	Relocation Payments[2/]	Land Rights	Total Other	
Subtotal - Watershed	2,014,020	152,126	6,439	2,172,585	6,601	469,105	475,706	2,648,291
Project Administration	xxx	xxx	xxx	[4/]359,968	xxx	xxx	16,400	376,368
GRAND TOTAL	2,014,020	152,126	6,439	2,532,553	6,601	[5/]469,105	492,106	3,024,659

1/ Price Base: 1972
2/ Relocation payments for displacement prior to July 1, 1972, will be shared as provided in PL 91-646 and in paragraph numbered 1 of the supplemental watershed work plan agreement.
3/ Type of channel before project: (N) - an unmodified, well-defined natural channel or stream.
4/ Includes $180,978 for construction inspection.
5/ Includes $22,500 for modifying roads, utilities, and improvements.

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REVISED TABLE 38 - STRUCTURAL DATA - GRADE STABILIZATION STRUCTURES

Aquilla-Hackberry Creek Watershed, Texas

Structure Number	Drainage Area (acre)	Detention Capacity Principal Spillway Inches	Detention Capacity Principal Spillway Acre-Feet	Elevation Principal Spillway (m.s.l.)	Elevation Emergency Spillway (m.s.l.)	Elevation Top of Dam (m.s.l.)	Principal Spillway Capacity (Maximum) (c.f.s.)	Volume of Fill (cu. yd.)
11-2	358	1.55	46	704.0	710.0	712.0	133	13,000
11-3	198	1.66	27	690.0	697.0	699.0	91	11,700
14-1	392	1.10	36	706.0	708.5	710.5	205	20,500
14-2	173	2.01	29	690.0	699.5	701.5	57	10,800
15-1	262	1.64	35	676.0	681.0	683.0	120	17,600
15-2	165	0.44	6	671.0	673.0	675.0	130	5,000
20-1	473	1.65	65	626.0	638.5	640.5	266	15,800
101	128	1.48	16	649.0	655.0	657.0	69	11,500
102	275	1.40	32	662.0	667.5	669.5	172	11,800
103	134	1.58	18	652.0	655.0	657.0	68	13,000
104	109	0.57	6	630.0	632.5	634.5	172	9,000
105	269	1.76	40	658.0	664.2	666.2	113	14,000
106	258	0.90	19	667.0	669.0	671.0	200	15,700
107	166	1.92	26	620.0	629.6	631.6	69	12,600
108	153	1.61	20	654.0	659.0	661.0	78	12,800
109	70	1.23	7	660.0	665.5	667.5	51	8,000
110	77	0.97	6	650.0	652.2	654.2	68	7,000
111	102	1.72	15	621.0	625.2	627.2	44	8,600
114	83	1.42	10	584.0	588.5	590.5	53	6,000
117	78	0.25	2	619.0	621.0	623.0	103	3,500

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REVISED TABLE 4 - ANNUAL COST

Aquilla-Hackberry Creek Watershed, Texas

(Dollars)[1/]

Evaluation Unit	Amortization of Installation Cost[2/]	Operation and Maintenance Cost	Other Economic Cost[3/]	Total
Aquilla Creek 12 Floodwater Retarding Structures; 35,450 feet of Channel Work; and 2 Grade Stabilization Structures	37,274	4,128	1,835	43,237
Little Aquilla Creek 1 Floodwater Retarding Structure	3,949	292	300	4,541
Hackberry Creek 10 Floodwater Retarding Structures; 46,845 feet of Channel Work; and 18 Grade Stabilization Structures	45,584	7,626	1,610	54,820
Project Administration	12,330	xxx	xxx	12,330
GRAND TOTAL	99,137	[4/]12,046	3,745	114,928

1/ Price Base: Installation cost based on 1972 prices; O&M cost based on adjusted normalized prices.

2/ 100 years at 3.125 percent, except for grade stabilization structures Nos. 14-1, 15-2, 106, and 117, which are at 3.250 percent.

3/ Excess of value of production lost in dam, spillway, and pool areas over value of easements at appraised market value.

4/ Includes cost of $1,823 for replacement of structures or appurtenances requiring replacement before end of the 100-year evaluation period.

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REVISED TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Aquilla-Hackberry Creek Watershed, Texas

(Dollars)[1/]

Item	Estimated Average Annual Damage: Without Project	With Project	Damage Reduction Benefits
Floodwater			
Crop and Pasture	61,851	11,819	50,032
Other Agricultural	30,261	4,637	25,624
Non-Agricultural			
Road and Bridge	9,699	489	9,210
Urban	3,386	239	3,147
Subtotal	105,197	17,184	88,013
Sediment			
Overbank Deposition	92	20	72
Aquilla Reservoir	35,186	18,244	16,942
Subtotal	35,278	18,264	17,014
Erosion			
Flood Plain Scour	2,025	269	1,756
Land Voiding and Depreciation[2/]	15,261	0	15,261
Subtotal	17,286	269	17,017
Indirect	15,776	3,572	12,204
TOTAL	173,537	39,289	134,248

1/ Price Base: Adjusted normalized prices.

2/ Damages and benefits are evaluated only for those critical areas above grade stabilization structures.

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REVISED TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES
Aquilla-Hackberry Creek Watershed, Texas
(Dollars)[1/]

Evaluation Unit	AVERAGE ANNUAL BENEFITS: Flood Prevention: Damage Reduction	Intensification of Land Use	Incidental Recreation	Redevelopment	Secondary	Total	Average Annual Cost 2/	Benefit-Cost Ratio
Aquilla Creek 12 Floodwater Retarding Structures; 35,450 feet of Channel Work; and 2 Grade Stabilization Structures[3/]	50,151	12,160	7,590	6,177	7,316	83,394	43,237	1.9:1.0
Little Aquilla Creek 1 Floodwater Retarding Structure	3,564	854	1,330	637	1,088	7,473	4,541	1.6:1.0
Hackberry Creek 10 Floodwater Retarding Structures; 46,845 feet of Channel Work; and 18 Grade Stabilization Structures[3/]	64,451	6,607	12,877	6,297	8,128	98,360	54,820	1.8:1.0
Project Administration							12,330	
GRAND TOTAL	[4/]118,166	19,621	21,797	13,111	16,532	189,227	114,928	1.6:1.0

1/ Adjusted normalized prices, April 1966
2/ From table 4.
3/ Interrelated measures.
4/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of $16,082 annually.

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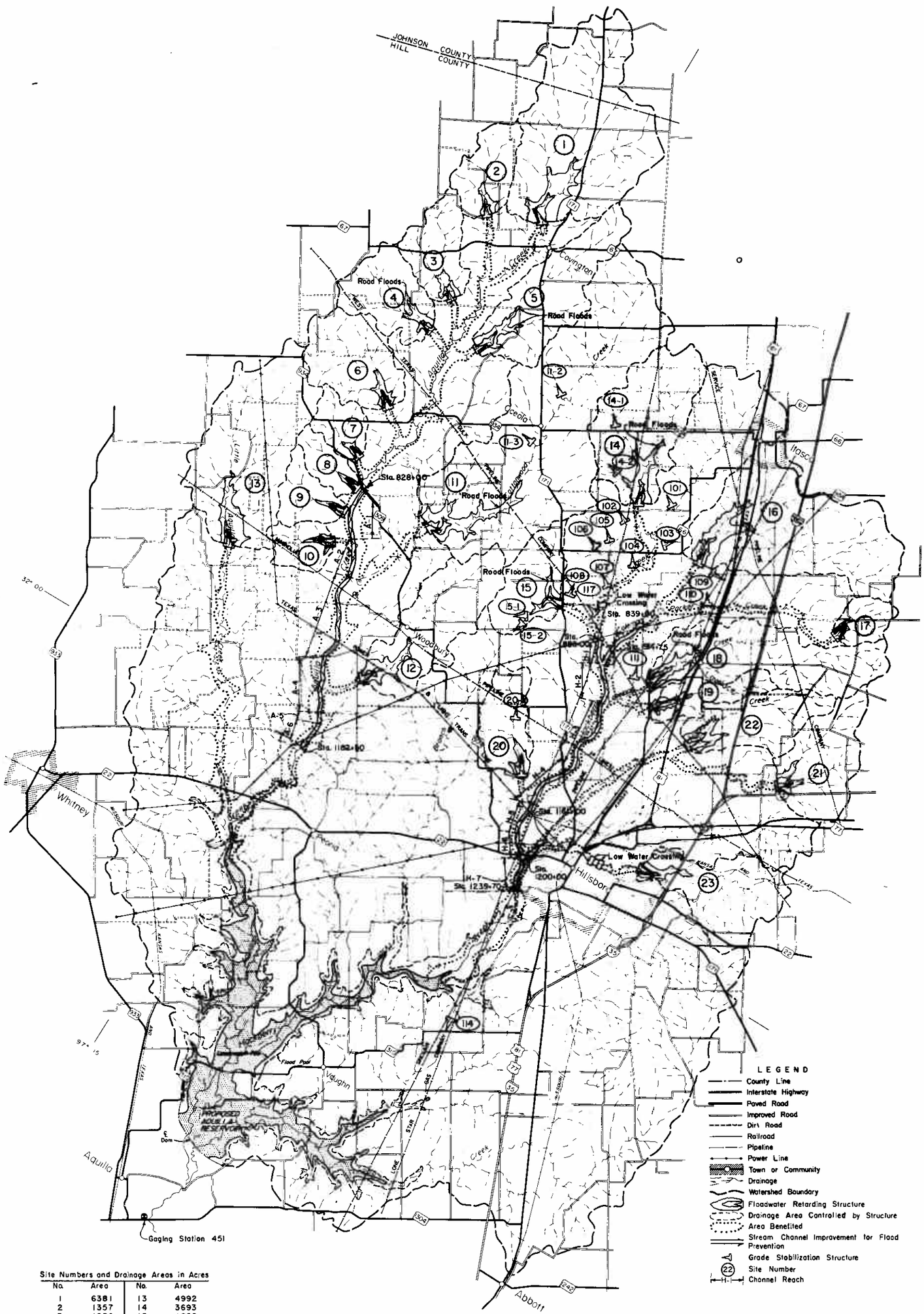

Site Numbers and Drainage Areas in Acres

No.	Area	No.	Area
1	6381	13	4992
2	1357	14	3693
3	1536	15	1658
4	1920	16	5824
5	3130	17	672
6	2253	18	3622
7	762	19	979
8	666	20	1408
9	781	21	2291
10	890	22	2093
11	10502	23	2643
12	3136		

Figure 5

PROJECT MAP

AQUILLA-HACKBERRY CREEK WATERSHED

HILL AND JOHNSON COUNTIES, TEXAS

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEMPLE, TEXAS

Rev. 9-72 1-67 4-R-23,339

JANUARY 1966 Rev. 5-67 Rev. 12-66 4-R-20934