EXHIBIT J: VEGETATION INFORMATION

The 1987 vegetation information still applies. We are also including the original maps from the 1987 amendment because they are referenced in the language in the 1987 amendment vegetation information.

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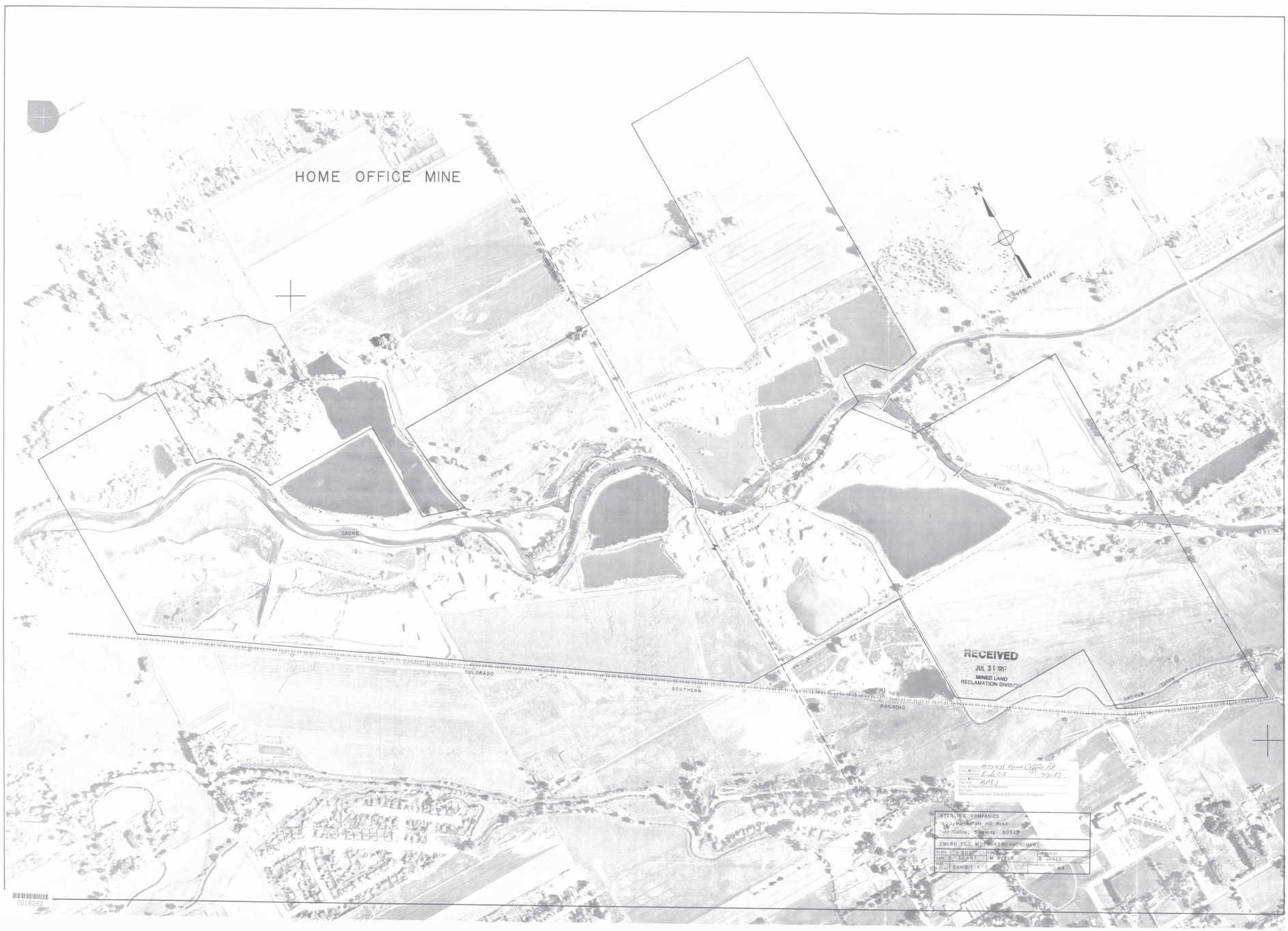
EXHIBIT C - 6; VEGETATION MAP

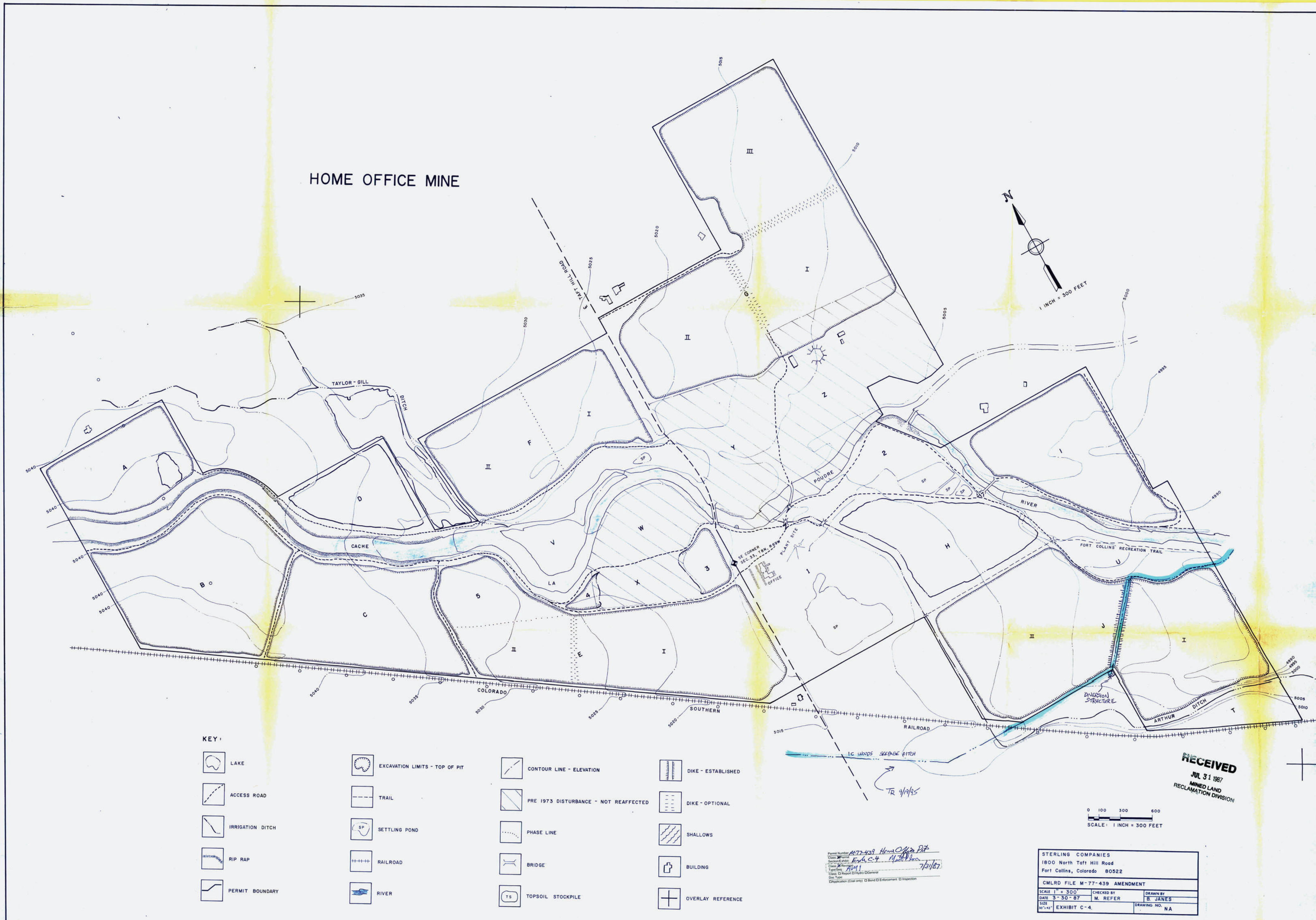
The aerial photograph of Exhibit C - 3, offers the best representation of ground cover present at the time of this amendment. Location and relative size and kind of trees, crops, shrubs, and grasses are clearly visible. Topographic and affected land features which will influence the occurrence of native vegetation is best represented by the same information represented on the mine plan map of Exhibit C - 4. Therefore, Exhibit C - 4 has been overlain onto the aerial photograph to create this exhibit. Additional information and quantitative data is presented in detail under Exhibit J - Vegetation Information.

Additionally, U.S. Soil Conservation Service range site descriptions (as discussed under Exhibit J) correlate directly to the soils encountered. Therefore, soil information as presented under Exhibit C - 5, Soils Map, is included under this exhibit. There are two range site descriptions for the affected area; Wetlands Range Site, and Overflow Range Site. They are characterized, and correlated to affected soils, under Exhibit J.

Essentially, soils (81) and (105) are covered by the Overflow Range Site description. The remaining affected soils are covered by the Wetlands Range Site description. The two unaffected soils, (7) and (60), have different range site descriptions, however, since these areas will not be affected over the life of the mine, their characterizations have not been detailed in this amendment.


HOME OFFICE MINE
N
1 INCH = 300 FEET
CACHE
LA
POUDRE
RIVER
COLORADO
SOUTHERN
RAILROAD
ARTHUR
DITCH
RECEIVED
JUL 31 1987
MINED LAND
RECLAMATION DIVISION
STERLING COMPANIES
1800 North Taft Hill Road
Fort Collins, Colorado 80523
CMLRD FILE M-77-439 AMENDMENT
SCALE 1" = 300'
DATE 7-30-87
DRAWN BY M. PETER
CHECKED BY B. JANES
SIZE D-Size
EXHIBIT C-3
Drawing No. NA

0016092


HOME OFFICE MINE
TAYLOR - GILL DITCH
TAFT HILL ROAD
CACHE LA POUDRE RIVER
COLORADO SOUTHERN RAILROAD
FORT COLLINS RECREATION TRAIL
ARTHUR DITCH
SE CORNER SEC. 33, T8N, R69W
OFFICE
PLANT SITE
DIVERSION STRUCTURE
IC WOODS SEEPAGE DITCH
TR 9/19/95
N
1 INCH = 300 FEET
5040
5035
5030
5025
5020
5015
5010
5005
5000
4995
4990
KEY:
LAKE
ACCESS ROAD
IRRIGATION DITCH
RIP RAP
PERMIT BOUNDARY
EXCAVATION LIMITS - TOP OF PIT
TRAIL
SETTLING POND
RAILROAD
RIVER
CONTOUR LINE - ELEVATION
PRE 1973 DISTURBANCE - NOT REAFFECTED
PHASE LINE
BRIDGE
TOPSOIL STOCKPILE
DIKE - ESTABLISHED
DIKE - OPTIONAL
SHALLOWS
BUILDING
OVERLAY REFERENCE
0 100 300 600
SCALE: 1 INCH = 300 FEET
RECEIVED
JUL 31 1987
MINED LAND RECLAMATION DIVISION
M-77-439 Home Office Pit
Exh. C-4
AM1
7/31/87
STERLING COMPANIES
1800 North Taft Hill Road
Fort Collins, Colorado 80522
CMLRD FILE M-77-439 AMENDMENT
SCALE 1" = 300'
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DRAWN BY B. JANES
DATE 3-30-87
EXHIBIT C-4.
DRAWING NO. NA

0016089

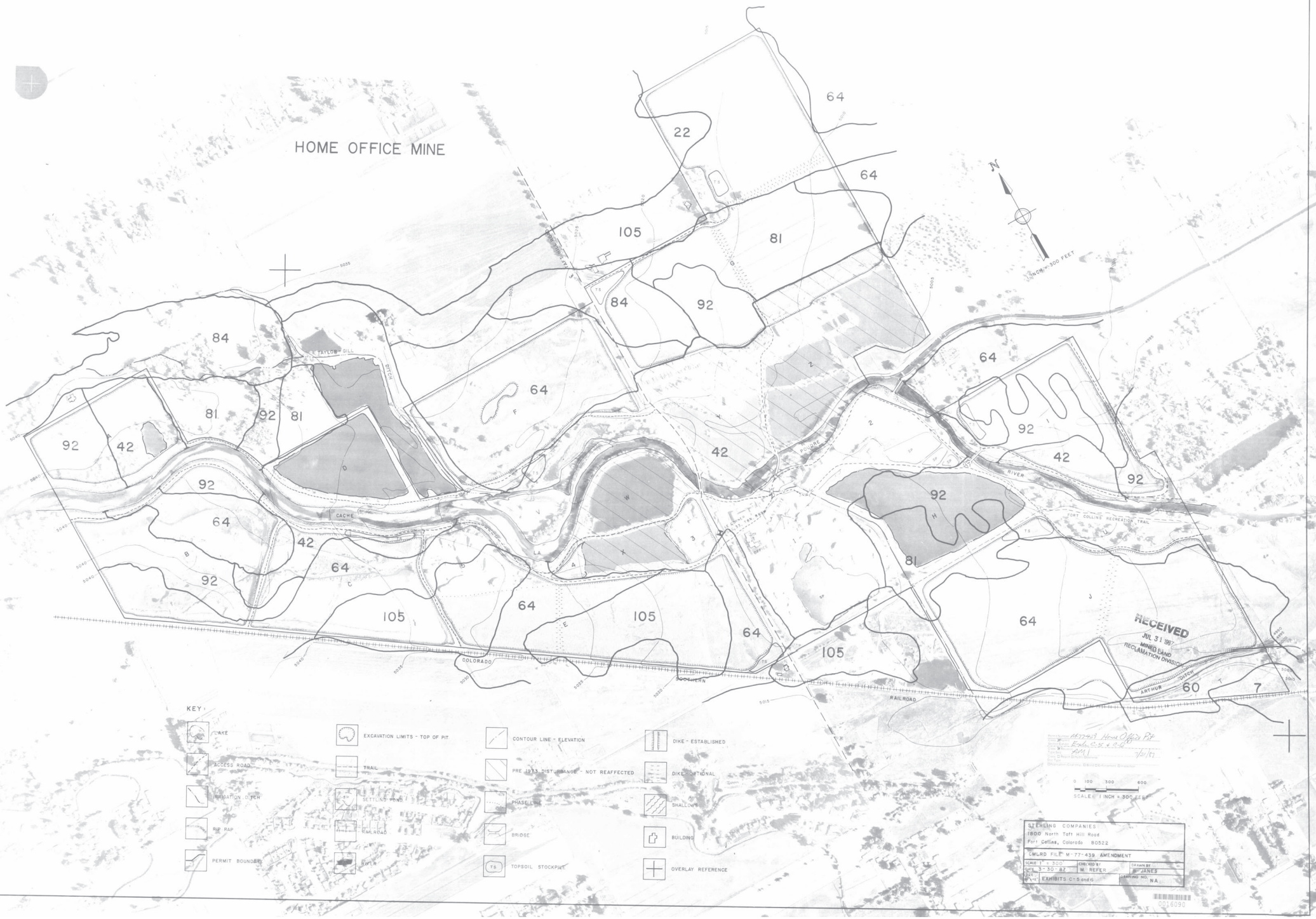
HOME OFFICE MINE
64
22
64
105
81
84
92
64
84
TAYLOR GILL
DITCH
81
92
81
92
42
64
42
92
92
64
CACHE
42
64
92
105
64
105
64
105
64
92
42
92
81
64
RECEIVED
JUL 31 1987
MINED LAND
RECLAMATION DIVISION
60
7
POUDRE
RIVER
FORT COLLINS RECREATION TRAIL
ARTHUR
DITCH
COLORADO
SOUTHERN
RAILROAD
KEY:
LAKE
ACCESS ROAD
IRRIGATION DITCH
RIP RAP
PERMIT BOUNDARY
EXCAVATION LIMITS - TOP OF PIT
TRAIL
SETTLING POND
RAILROAD
RIVER
CONTOUR LINE - ELEVATION
PRE 1973 DISTURBANCE - NOT REAFFECTED
PHASE LINE
BRIDGE
TOPSOIL STOCKPILE
DIKE - ESTABLISHED
DIKE - OPTIONAL
SHALLOWS
BUILDING
OVERLAY REFERENCE
SCALE: 1 INCH = 300 FEET
STERLING COMPANIES
1800 North Taft Hill Road
Fort Collins, Colorado 80522
CMLRD FILE M-77-439 AMENDMENT
SCALE 1" = 300'
DATE 3-30-87
CHECKED BY M. REFER
DRAWN BY JP JANES
SIZE D
EXHIBITS C-5 and 6
DRAWING NO. NA
0015090

EXHIBIT J - VEGETATION INFORMATION

The vegetation inventories for the original permitted areas are included at the back of this exhibit for referrence. Information for Pit #1 & 2, are from the U.S.S.C.S. range site descriptions. The actual range site descriptions are also included. Reclamation Pit #1, and Seaworth Pit, are the only sites that have had on-site evaluations by the U.S.S.C.S. They are also included at the end of this exhibit.

The February 22, 1978 inventory by Roman V. Bockus, indicates the dominance of inland salt grass on the Reclamation Pit #1 site. It suggests its presence is due to a high saline water table. This is supported by the fact that the soils in the area are mildly to moderately alkaline, with the electrical conductivity of a saturated soil extract approaching 4 mmhos/cm. for some soils. This potential is accounted for in the proposed seed mixture with the inclusion of Inland saltgrass and Alkali sacaton in the seed mixture.

The most current field inventory of vegetative cover occurred on the Seaworth property in July, 1986. Although it is debateable that the species composition is representative of the entire amendment area, the 30% density is not out of character with that described in the more generic range site description given for the Overflow range site of 35%. Due to the general similarity of habitat, elevation, aspect, and other edaphic and climatic similarities, 30% cover should function as a good standard for judging success and release of the affected lands, as revegetated, utilizing the seed mixture proposed under Exhibit E.

For the most part, the range site descriptions tend to justify the use of Western wheatgrass, Switchgrass, and Big bluestem in the seed mixture on the basis of natural occurrence and adaptability. Canarygrass and Sand dropseed were included in the mixture to account for variability in soil moisture and texture, with Canarygrass well adapted to inundated areas and moist soils of all textures, and Sand dropseed taking to the dryer, sandy textured soils, or new soils.

Due to the great extent of the affected land, potential variation in composition and percent cover of vegetation will be highly varied and contradictary regardless of sampling. The range site descriptions offer the best picture of what should occur on an area of this nature. The seed mixture proposed under Exhibit E, should offer a good balance in returning vegetation cover in character with the original.

RANGE CONDITION INVENTORY FROM M-86-049, SEAWORTH PIT

CO-ECS-1(4/81)
File: 190-19-16
(Formerly CO-Range-6)

U.S. Department of Agriculture
Soil Conservation Service

Sprock, Riggle
Conservationist

7-2-86
Date

RANGE CONDITION INVENTORY

RANGE SITE Wet meadow-Irrig Pasture SOIL UNIT #64 Loveland cl

LAND UNIT Sterling Companies LOCATION OF INVENTORY Avdre River

Field Number 2
Acres

VEGETATION

List of Plant Species			% composition by weight (air-dry)	% in potential plant community
Grasses and Grass-like				
Kentucky bluegrass			45	
western wheatgrass			2	
smooth brome			2	
downy brome			1	
sedge			1	
Baltic rush			1	
quack grass			30	
tall fescue			10	
orchard grass			T	
buffalo grass			T	
foxtail barley			1	
Nebraska sedge			T	
redtop	timothy		T	T
	musk thistle	curly dock	T	T
Forbs and Shrubs				
scouring rush	western ragweed		1	T
tansy mustard	bouncy weed		1	T
wild licorice	prickly poppy		T	T
bindweed	clover		1	3
Kochia	russian olive		T	T
mullin	cottonwood		T	T
canada thistle	alfalfa		1	T
yarrow	curlycup gumweed		T	T
Other Forbs and Traces (T)	giant gaura		5	T
Totals	dandelion	yellow sweetclover	T	T
	showy cinquefoil		T	

Vegetation Density 30 % Range Condition Class * N/A

Annual Yield, Total 150 Kg/ha _____ lbs/ac air-dry

Major Animal Classes Planned for N/A

** Annual Palatable Yield, Total _____ Kg/ha _____ lbs/ac air-dry

Annual Useable Yield, Total _____ Kg/ha _____ lbs/ac air-dry

* Range condition class may be lowered one condition class from Excellent, Good or Fair when total annual yield is significantly (25%) below the site's potential.

** See back page

OVERFLOW AND WET MEADOW RANGE SITE DESCRIPTIONS

USDA, Soil Conservation Service
Section II-E

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
_____, COLORADO FIELD OFFICE

Overflow #36
ECO - SITE DESCRIPTION
MLRA 49B, 67, 72
November 1983

A. PHYSICAL CHARACTERISTICS

1. Physiographic Features

Draws, swales, valleys and streamsides are typical landscape characteristics of this site. The site's position is one that benefits from natural surface "irrigation" from water moving onto or over it. The site occurs on nearly level to gently sloping land. Elevation ranges from 3,350 to 6,400 feet (1,021 to 1,950 meters).

2. Climatic Features

a. The climate is semi-arid with precipitation averaging 11 to 18 inches (28 to 46 centimeters). Total yearly snowfall varies from 21 to 82 inches (53 to 208 centimeters). The average monthly precipitation for the three Land Resource Areas that this site occurs in is as follows:

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
LRA 49B	.47	.70	1.09	1.76	2.39	2.17	2.86	2.45	1.49	1.06	.67	.48	17.6
LRA 67	.34	.40	.78	1.38	2.28	2.03	2.30	2.00	1.25	.84	.50	.32	14.4
LRA 72	.37	.39	.91	1.63	3.05	3.03	2.58	1.99	1.33	.92	.53	.39	17.1

b. The average growing season for the three Land Resource Areas are as follows: For resource area 49 the last killing frost varies from about May 9 to May 26 and the first killing frost in the fall occurs between September 17 and October 8. This allows 107 to 152 days for the growing season. For resource areas 67 and 72 the last killing frost in the spring ranges from May 3 to May 16 and the first frost in the fall may occur as early as September 26 and as late as October 16. This provides an average growing season of 127 to 166 days. There is usually sufficient moisture at the beginning of the growing season to initiate growth in such cool-season grasses as Canada wildrye, green needlegrass, slender wheatgrass, and western wheatgrass. Their optimum growth is early April through June. The warm season grasses have their optimum growing season from May to July, if adequate moisture is available. About 70 percent of the annual precipitation falls in the form of rain during the frost-free season. About 90 percent of the annual precipitation benefits cool-season plants, 79 percent benefits warm season plants and the rest falls during the season of plant dormancy.

c. The average annual temperature is 49°F (9.4°C) with 8-64 days higher than 90°F (32°C) and 124-192 days lower than 32°F (0°C). Temperatures fall below the freezing mark much of the time in December through February.

d. Winters are generally cold and dry. High intensity winds in the fall and winter months are common in LRA 49. Hot dry winds are common in land resource areas 67 and 72 resulting in high evapotranspiration rates. Wind velocities for the area average 1.8 to 5.0 miles (1.1-3.1 km) per hour and are prevailing from the north during the winter and south westerly during the spring and summer. Generally, February through April and November through December are the windiest months. Strong winds during the spring cause rapid drying of the soil surface. Relative humidity is low. The sun shines approximately 75 percent of the time during the year.

3. Native (Climax Potential) Vegetation

a. The plant community is about 75-90 percent grasses, 5-10 percent forbs, and 5-15 percent shrubs air-dryweight.

The production is predominantly made up of grasses; however, scattered shrubs such as fourwing saltbush, winterfat and green plume rabbitbrush give this site a mottled look.

The dominant grasses are western wheatgrass, switchgrass and green needlegrass. Less abundant grasses are blue grama, big bluestem, sideoats grama, yellow Indiangrass, and lesser amounts of Canada wildrye and buffalograss. Forbs that make up the plant community are Missouri goldenrod, rag sumpweed, upright prairie coneflower with lesser amounts of curlycup gumweed, prairie groundsel, Louisiana sagebrush, Missouri milkvetch, plains larkspur, scarlet globemallow and slimflower scurfpea.

The dominant shrubs that occur on this site are fourwing saltbush, with lesser amounts of fringed sagebrush, green plume rabbitbrush, plains pricklypear, rubber rabbitbrush and winterfat.

b. Relative percentage of total plant community by weight, air-dry:

Symbol	Common Name	Scientific Name	Percent
Grasses and Grasslike Plants			
ANGE	big bluestem	Andropogon gerardii	5-10
BOGR2	blue grama	Bouteloua gracilis	5-10
SIHY	bottlebrush squirreltail	Sitanion hystrix (2)	0-1
BUDA	buffalograss	Buchloe dactyloides	0-1
ELCA4	Canada wildrye	Elymus canadensis	1-7
STVI4	green needlegrass	Stipa viridula	15-25
SCSC*	little bluestem	Schizachyrium scoparium	0-3
ARLO3	red threeawn	Aristida longiseta	0-1
SPCR	sand dropseed	Sporobolus cryptandrus	0-1
BOCU	sideoats grama	Bouteloua curtipendula	0-5
AGTRT*	slender wheatgrass	Agropyron trachycaulum trachycaulum	0-3
PAVI2	switchgrass	Panicum virgatum	10-20
AGSM	western wheatgrass	Agropyron smithii	35-40
SONU2	yellow Indiangrass	Sorghastrum nutans	5-10
	other native grasses		0-3
Forbs			
GRSQ	curlycup gumweed	Grindelia squarrosa	0-T
KUEU	falseboneset	Kuhnia eupatorioides	0-1
ARLU	Louisiana sagebrush	Artemisia ludoviciana	0-T
SOMI2	Missouri goldenrod	Solidago missouriensis	0-1
ASMI10	Missouri milkvetch	Astragalus missouriensis	
ASPE5	narrowleaf poisonvetch	Astragalus pectinatus	0-1
DEVI	plains larkspur	Delphinium virescens	0-1
SEPL	prairie groundsel	Senecio plattensis	0-T
IVAN2	rag sumpweed	Iva xanthifolia	0-2
SPCO	scarlet globemallow	Sphaeralcea coccinea	0-1
PSTE3	slimflower scurfpea	Psoralea tenuiflora	0-1
RACO3	upright (Mexican Hat) prairie coneflower	Ratibida columnifera	0-2
	other native forbs		0-5
Shrubs			
ATCA2	fourwing saltbush	Atriplex canescens	5-15
ARFR4	fringed sagebrush	Artemisia frigida	0-T
CHNAG2*	green plume rabbitbrush	Chrysothamnos nauseosus graveolens	0-1
OPPO	plains pricklypear	Opuntia polyacantha	0-T
CHNAN*	rubber rabbitbrush	Chrysothamnus nauseosus nauseosus	0-T
CELA2*	winterfat	Ceratoides lanata	1-5
	other native shrubs		T-3

*Symbol not listed in National List of Scientific Plant Names.

c. If ecological retrogression is cattle-induced, desirable grasses will decrease. However, if retrogression is sheep-induced, desirable forbs and shrubs may be reduced. Deterioration of this site caused by overgrazing of cattle will decrease the percentage of grasses such as switchgrass, yellow Indiangrass, western wheatgrass, big bluestem, and green needlegrass. Fourwing saltbush will decrease especially if used heavily through the growing season. Winterfat will decrease with heavy spring use. With the decrease of above mentioned plants blue grama, sand dropseed will increase initially. Forbs will increase such as curlycup gumweed and shrubs such as rubber rabbitbrush, and plains pricklypear will also increase. Plant species likely to invade or increase in density will be red threeawn, curly dock, devil beggarticks, Canada thistle, musk bristlethistle, pepperweed whitetop, and annuals such as tumbling Russian thistle, kochia, six weeks fescue, cheatgrass, cocklebur, field penneycress, flixweed tansymustard, pinnate tansymustard, redroot pigweed.

d. Vegetation density[1/] is approximately 35 percent.

1/ Vegetation density = basal area. This is the area of ground surface covered by the perennial stem or stems. Usually, this is measured one inch (2.54 cm) above the soil in contrast to the full spread of perennial foliage.

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4. Annual Production

If the range is in excellent condition, the approximate total annual production (air-dry) is:

favorable years	2,800 pounds/Ac	3,138 Kg/Ha
normal years	2,000 pounds/Ac	2,241 Kg/Ha
unfavorable years	1,200 pounds/Ac	1,344 Kg/Ha

Of this production 10 to 20 percent will likely be unpalatable or out of reach to grazing animals.

5. Soils

a. The soils of this site are deep, well drained and found on terraces and floodplains. They are formed in calcareous loamy alluvium deposited by intermittent streams. The soil texture ranges from a sandy loam to clay loam.

b. Major soils associated with this site are:

Barnum loam
Clayey alluvial land
Garrett loam
Goshen silt loam
Haverson clay loam, loam
Loamy alluvial land
Manzanola loam
Paoli fine sandy loam, loam
Rago clay loam variant
Table Mountain loam
Ustic thorrifluvents gravelly sandy loam

B. MAJOR USES AND INTERPRETATIONS FOR:

1. Grazing

This site provides excellent forage for cattle and horses throughout the year. It provides good forage for sheep, antelope, deer and small animals.

The animal forage preference changes as the growing season progresses. Western wheatgrass and green needlegrass are palatable during the spring, switchgrass, big bluestem and yellow Indiangrass are palatable during the spring and summer. Fourwing saltbush and winterfat are especially valuable forage in the winter. It is important that a proper stocking rate and planned deferment are carried out so these plants are not grazed out and repalced by less desirable plants.

Vegetation palatability will influence proper grazing use considerations. The season of use, climate, kind of grazing animal, past grazing use and plant composition will directly influence the animal preference and performance.

2. Habitat for Wildlife

This range site provides habitats which support a resident animal community that is characterized by a good population of antelope, jackrabbit, coyote and numerous small mammals and birds.

3. Hydrological Interpretations

Soils in this site are grouped into "B and C" hydrologic group, as outlined in the "Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979" handbook. Field investigations are needed to determine hydrological cover conditions and hydrologic curve numbers. The hydrologic curve number for Group "B" soil is about 61 and Group "C" the hydrologic curve number is 74 when hydrologic conditions are good, as shown in "Peak Flows in Colorado" handbook.

Refer to SCS National Engineering Handbook, Section 4, to determine runoff quantities from the curves.

4. Recreation and Natural Beauty

This site has a high aesthetic appeal and natural beauty when in excellent condition but declines rapidly as condition declines. The lush growth is a pleasant break from the droughty areas that surround this site.

5. Endangered Plants and Animals

The greater prairie chicken in Northern Colorado and the lesser prairie chicken in Southern Colorado are present in isolated flocks. The black footed ferret has been associated with sites near prairie dog towns.

6. Major Poisonous Plants to Livestock That May Cause Poisoning

Common Name	Scientific Name	Season Dangerous	Animals Affected
plains larksupr	Delphinium virescens	early growth is most toxic but all parts of plant are poisonous and can poison after seeds start to mature.	cattle, rarely horses and sheep unless subjected to sudden physical activity.

Effect and symptoms

Nervousness, weakness and staggering gait, animal may fall suddenly. Muscular twitching, nausea and vomiting, bloating, frequent swallowing, salivation and rapid pulse. Animal may die suddenly especially if excited which intensifies the symptoms, retardation of heat action and paralysis of the respiratory centers.

Common Name	Scientific Name	Season Dangerous	Animals Affected
narrowleaf poisonvetch	Astragalus pectinatus	early in spring when forage is scarce.	cattle

Effect and symptoms

Poisoning is associated with selenium poisoning. When plants are crushed in the hand, a sulfurous odor is given off. Poisoning is cumulative. Poisoning can cause alkali disease (the chronic disease) which develops from eating small amounts of selenium-bearing vegetation over an extensive period of time or poisoning can cause blind staggers (the acute disease) which results from feeding on relatively large amounts of selenium in a short time. In acute cases of selenium poisoning, animals walk aimlessly into objects. "Blind staggers" or alkali disease are names given for the disease. Hoofs grow abnormally with the formation of deep rings. The hair falls out--especially the mane and tail of horses. Recovery of animals affected may take several months or years, even after being placed on good forage.

7. Location of Typical Examples of the Site

a. Hoyer Ranch, NW of Akron, Washington County
b. Eagle Rock Ranch, NE of Rockport, Weld County
c. Double R Farms, N of New Raymer, Weld County

8. Guide to Initial Stocking Rates 2/

Condition Class	Percent Climax Vegetation	ha/AUM	AUM/ha	ac/AUM	AUM/ha
Excellent	76-100	.61-.81	1.6-1.2	1.4-2	.66-.50
Good	51-75	.81-1.6	1.2-.62	2-4	.50-.25
Fair	26-50	1.6-2.4	.62-.41	4-6	.25-.17
Poor	0-25	2.8(+)	.35(-)	7(+)	.14(-)

2/ Stocking rates are based on an average growing season. Based on 1,200 pounds (540 kg) of forage (air-dry) per animal unit month. (This figure takes into account the vegetation that disappears through trampling, small herbivores, etc., which amounts to approximately 7.9 pounds (3.6 kg) per day under normal conditions).

9. Field Offices

Akron	Cheyenne Wells	Greeley	Lakewood
Brighton	Colorado Springs	Haxtun	Longmont
Burlington	Flagler	Hugo	Simla
Byers	Fort Collins	Julesburg	Sterling
Castle Rock	Fort Morgan	Kiowa	Wray
			Yuma

10. Vegetation Palatability per Animal Class 3/

Plant Symbol	Common Name	Scientific Name	Animal Classes 4/ C	S	H	E	D	A	G B	S B	S M
Grass & Grasslike Plants			**Animal Preference 5/**								
ANGE	big bluestem	Andropogon gerardii	H	H	H	M	M	M	M	M	M
BOGR2	blue grama	Bouteloua gracilis	H	H	H-	M	M	M	M	H	M
SIHY	bottlebrush squirreltail	Sitanion hystrix (2)	M	M	M	M	M	M	M	M	M
BUDA	buffalograss	Buchloe dactyloides	H	H	H	L	L	M	M	M	M
ELCA4	Canada wildrye	Elymus canadensis	M	M	M	M	M	M	M	M	M
STVI4	green needlegrass	Stipa viridula	H	H	H	M	M	M	M	H	H
SCSC*	little bluestem	Schizachyrium scoparium	H	M	H	L	M	L	M	M	M
ARLO3	red threeawn	Aristida longiseta (2)	L	L	L	L	L	L	M	M	M
SPCR	sand dropseed	Sporobolus cryptandrus	M	M	M	L	L	L	H	H	H
BOCU	sideoats grama	Bouteloua curtipendula	H	H	H	M	M	M	M	M	M
AGTRT*	slender wheatgrass	Agropyron trachycaulum(4) trachycaulum	H	H	H	H	M	M	M	M	M
PAVI2	switchgrass	Panicum virgatum	H	M	H	M	M	M	H	H	H
AGSM	western wheatgrass	Agropyron smithii	H	M	H	M	M	M	L	M	M
SONU2	yellow Indiangrass	Sorghastrum nutans	H	H	H	M	M	M	M	M	M
Forbs											
GRSQ	curlycup gumweed	Grindelia squarrosa (4)	L	L	L	L	L	L	L	L	L
ARLU	Louisiana sagebrush	Artemisia ludoviciana	M	H	M	M	M	H	M	M	M
SOMI2	Missouri goldenrod	Solidago missouriensis	L	M	I	M	M	H	M	M	M
ASMI10	Missouri milkvetch	Astragalus missouriensis (2)	L	L	L	L	L	L	L	L	L
DEVI	plains larkspur	Delphinium virescens (2)	L	L	L	L	L	L	L	L	L
SEPL	prairie groundsel	Senecio plattensis	L	L	L	L	L	L	L	L	L
IVAN2	rag sumpweed	Iva xanthifolia	L	L	L	L	L	L	L	L	L
SPCO	scarlet globemallow	Sphaeralcea coccinea (3)	M	M	M	H	H	H	M	H	H
PSTE3	slimflower scurfpea	Psoralea tenuiflora	L	M	L	L	L	M	M	M	L
RACO3	upright (Mexican Hat) prairie coneflower	Ratibida columnifera	L	M	L	L	M	M	M	M	M
Shrubs											
ATCA2	fourwing saltbush	Atriplex canescens	H	H	M	H	H	H	H	H	H
ARFR4	fringed sagebrush	Artemisia frigida	M	H	M	H	H	H	M	M	M
CHNAG2*	green plume rabbitbrush	Chrysothamnos nauseosus (6) graveolens	M	M	M	H	H	M	M	M	H
OPPO	plains pricklypear	Opuntia polyacantha (4)	L	L	L	L	L	M	M	M	H
CHNAN*	rubber rabbitbrush	Chrysothamnus nauseosus (6) nauseosus	L	L	L	L	L	L	M	M	M
CELA2*	winterfat	Ceratoides lanata	H	H	H	H	H	M	M	M	H

Note: *Symbol not listed in National List of Scientific Plant Names.

3/ Vegetation palatability by animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutritive value, stage of growth and season of use.

4/ Animal class symbols:
C - Cows
E - Elk
G/B - Upland Gamebirds
S - Sheep
D - Deer
S/B - Songbirds
H - Horses
A - Antelope

5/ Animal preference symbols:
H - High
M - Medium
L - Low

References

Gay, Charles W. and Don D. Dwyer. Poisonous Range Plants. Cooperative Extension Service, Circular 391, New Mexico State University, pp. 1-21, June 1967.

James, L. F. and et al. Plants Poisonous to Livestock in the Western States. Agriculture Information Bulletin No. 415, pp. 1-90, November 1980.

Durrell, L. W., Rue Jensen and Bruno Klinger. Poisonous and Injurious Plants in Colorado. Bulletin 412-A, pp. 1-88, June 1952.

United States Department of Agriculture. 22 Plants Poisonous to Livestock in the Western States. Agriculture Information No. 327, pp. 1-64, April 1968.

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service, Colorado

Technical Guide
Section II E

RANGE SITE NO. 38
Field Office
December 1975

RANGE SITE DESCRIPTION

for

WET MEADOW

Land Resource Area: Central High Plains (67)
Central High Tableland (72)

A. PHYSICAL CHARACTERISTICS

1. Physiographic Features

The appearance of the landscape is that typical of a meadow in a bottomland position. Slopes are nearly level to gently sloping. Elevations range from 3000 to 6000 feet.

2. Climatic Features

Precipitation zones are from 13 to 19 inches. From two thirds to three fourths of the precipitation falls during the period April 1 to September 30. This corresponds to the period of optimum plant growth.

3. Native (potential) Vegetation

A thick, luxuriant growth of tall grasses in combination with sedges, rushes and other species of wet bottomlands makes a ground cover which exceeds 60%. Dominant grasses are switchgrass, Indiangrass, prairie cordgrass and big bluestem. Other plants, less regular in consistent occurrence, are alkali sacaton, slender wheatgrass, western wheatgrass, Canada wildrye, prairie gentian, wild rose, snowberry, bundleflower, licorice, foxtail barley, little bluestem, saltgrass and scratchgrass.

Plants not a part of the native community that are most likely to invade when the cover deteriorates are kochia thistle, marsh-elder, greasewood and rabbitbrush.

Native (potential) Vegetation and Guide for Determining Range Condition.

Percentage composition by weight of the principal species may total as much as:

Switchgrass	20
Prairie cordgrass	15
Big bluestem	15
Western & Slender wheatgrass	15
Indiangrass	10
Sedges and rushes	10
Foxtail barley	5
Canada wildrye	5
Others (as listed above)	15

4. Total Annual Production

Favorable years	4000	Pounds	per	Acre	Air	Dry
Unfavorable years	3000	"	"	"	"	"
Median years	3500	"	"	"	"	"

5. Soils

a. Soils vary considerably in texture but are predominantly sandy. They range from deep to relatively shallow in meadows where they are underlain by clean sand or gravel. The high water table puts moisture within easy reach of plant roots the major part of the growing season, making conditions favorable for both cool and warm season plants. The tall, summer growing grasses with moderate to high moisture requirements can make the most effective use of the abundant soil moisture. Therefore, these grasses tend to dominate the vegetation along with various moisture loving plants.

Salts are sometimes present in low percentages, but have less effect on the vegetation than does the high water table. Salt tolerant species may become abundant under misuse. Erosion is generally not a serious problem unless the site occurs on sloping ground where gullies may lower the water table.

b. Soils in this site are:

Aquolls	Fluvaquentic haplaquolls
Arquistolls, wet	Flubaquents
Bijou sandy loam, wet	Wet alluvial land
Edgewater loam	

6. Rare, Threatened or Endangered Plants and Animals

(To be added when known)

7. Location of Typical Example of the Site

Along Denver - Boulder Toll Road, Boulder County

8. Field Offices in Colorado where the site occurs:

301 Akron
305 Brighton
306 Burlington
311 Cheyenne Wells
313 Colorado Springs
322 Flagler
323 Fort Collins
325 Fort Morgan
327 Golden
329 Greeley
336 Kiowa
341 Longmont
351 Simla
354 Sterling
361 Wray
362 Yuma
370 Eads

RANGE SITE DESCRIPTION - Colorado - 1974

B. Major Uses and Interpretations for the WET MEADOW Range Site

Use of Product	Value Rating				
	High	Medium	Low	Not Applicable	
1. Grazing					
Cattle	X				
Sheep		X			
Horses	X				
2. Wood Products				X	
3. Wildlife					
Antelope			X		
Bison	X				
Deer	X				
Elk	X				
Cottontail			X		
Jackrabbit			X		
Upland game birds			X		
Waterfowl	X				
4. Watershed		X			
5. Recreation and Natural Beauty	X				

M-78-256, RECLAMATION PIT #1, INFORMATION FROM EXHIBIT J

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
301 South Howes, Room 327, Ft. Collins, CO. 80521

February 22, 1978

Roman V. Bockus, A.I.P.
Planning Consultant
1752 Ura Lane
Denver, CO. 80234

RE: Vegetative Cover, Proposed Gravel Pit Areas

Dear Mr. Bockus:

The areas proposed as gravel pits are located along the Cache La Poudre River. These areas have been used as pasture and rangeland in the past. They are too stoney and unstable to be of much value for cropland.

The present vegetation consists of grasses, trees and forbs. The dominant grass is inland salt grass (Distichlis stricta) due to a high saline water table. Native forbs are cattails, sedges, rushes and other water tolerant species. Native trees are cottonwood and willows. Other grasses are Kentucky bluegrass, sand dropseed, switchgrass and prairie cordgrass.

The carrying capacity for cattle is not great since the species of grass found there are not particularly palatable. Under the trees there is no grass understorey which renders the woodland of no value for grazing. The existing grass cover can produce 1500-3000 lbs. per acre; but, as noted, these pounds are poor forage for the most part.

Sincerely,

Albert W. Yoxall
Acting District Conservationist

Enclosures:
Tracing of Soils Maps
Soil Interpretation Sheets

P.S. - For climatological data, contact the CSU Weather Station, (303) 491-6300.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
301 South Howes, Room 327, Ft. Collins, CO. 80521

March 3, 1978

Roman V. Bockus, A.I.P.
Planning Consultant
1752 Ura Lane
Denver, CO. 80234

Dear Mr. Bockus:

Some grasses that can be planted for revegetating spoil banks, wateredges, salty areas and dry areas are listed as follows:

Salty wet areas - tall wheatgrass, tall fescue or basin wildrye, alkali sacaton

Dry areas - crested wheatgrass, Russian wildrye or pubescent wheatgrass

Subirrigated Areas - smoothbrome, orchard grass or bluegrass

Waterline areas - reed canarygrass

All plantings should be made on a clean, firm seedbed. The seeding should be done by a grass drill with depth bands on the furrow openers (where it is possible to do so).

Sincerely,

Albert W. Yoxall
Acting District Conservationist

M-77-439, PIT #1, INFORMATION FROM EXHIBIT J

There may be sand or gravel below depths of 40 inches. Typically these soils have very dark grayish brown, fine sandy loam, topsoils; and dark grayish brown, fine sandy loam, substratum.

Throughout the site underlying gravel deposits are found to a mean depth of fifteen (15) feet.

(10) Exhibit J - Vegetation Information

The Vegetation Information is dependent upon and coincidental with existing soil conditions. This information is presented as two groups. The first group is "Overflow Range Site" and is representative of vegetation found in areas where the predominant soils are "Riverwash".

This site includes draws, valleys, fans and other lowlands. Slope runs from nearly level to about 5 percent. This site occurs where it receives periodic flooding. Elevation is generally below 6000 ft.

In the potential plant community tall grasses form a major part of the vegetation with mid and short grasses included to make an almost continuous cover. Switchgrass, big bluestem, western wheatgrass, Indiangrass and blue grama are the most abundant species. Prairie sandreed, slender wheatgrass, side oats grama, Canada wildrye, buffalograss, fourwing saltbush and winterfat are present in lesser amounts.

Following are percentages, by weight, of the total annual yield for the potential plant community:

Grasses and Grasslike Plants:	Percent
Switchgrass	10-20
Western wheatgrass	5-25
Big bluestem	5-15

Blue grama	10-20
Indiangrass	T-10
Prairie sandreed	T-10
Sideoats grama	T-10
Slender wheatgrass	T-10
Green needlegrass	T-4
Buffalograss	T-4
Canada wildrye	T-4
Sedge	T-4
Others	T-4
Forbs:	
Others	T-6
Shrubs:	
Fourwing saltbush	T-10
Winterfat	T-10
Others	T-4

The total annual yield of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 1,500 pounds per acre in unfavorable years.

Western wheatgrass, blue grama, buffalograss, three-awn, sand dropseed and rabbitbrush are the primary species to increase with the beginning of range depletion. As condition declines further snakeweed, wormwood, and annuals invade the site.

Up to 95 percent of the potential vegetation on this site provides forage for cattle.

The second group is "Wet Meadow Range Site". This site is representative of vegetation found in areas where the following soils persist: Paoli Fine Sandy Loam, Loveland Clay Loam, Caruso Clay Loam and Poudre Fine Sandy Loam.

Topography is smooth, nearly level meadows along streams, below permanent springs and in valleys having a high water-table. Slope ranges from nearly level to less than 3%. Elevation is generally below 6000 ft.

In the potential plant community the vegetation is dominated by tall grasses, principally switchgrass, Indiangrass, prairie cordgrass and big bluestem. Alkali sacaton, western wheatgrass, slender wheatgrass, alkali bluegrass, little bluestem, Canada wildrye, sedges and rushes occur in lesser amounts.

Prairie gentian, vetch, bundleflower, wild rose and wild licorice are also present in small amounts.

Following are percentages, by weight, of the total annual yield for the potential plant community:

Grasses and Grasslike Plants:	Percent
Switchgrass	10-30
Big bluestem	5-15
Prairie cordgrass	5-15
Indiangrass	T-10
Alkali sacaton	5-15
Western & Slender wheatgrass	5-15
Little bluestem	T-10
Alkali bluegrass	T-10
Sedges	T-10
Rushes	T-10
Canada wildrye	T-4
Saltgrass	T-6
Others	T-8
Forbs:	
Wild licorice	T-4
Others	T-6

Shrubs:

Others---------- T-2

The total annual yield of air-dry vegetation ranges from 4,000+ pounds per acre in favorable years to 3,000 pounds per acre in unfavorable years. Sedges, rushes, alkali sacaton, bluegrass, saltgrass, foxtail and wild licorice are the primary increasing species with the beginning of range depletion. As condition declines further foxtail and saltgrass increase and dandelion and annuals invade the site.

Up to 90 percent of the potential vegetation on this site provides forage for cattle.

(11) Exhibit K - Climate

The Climatological data for this pit is presented in the Climatology Report No. 77-1 (Appendix A) for the Fort Collins area which shows means, extremes and durations of temperature ranges on a month by month basis, as well as similar precipitation information.

In addition, an annual wind rose diagram for Fort Collins covering the period 1954-1963 is included as Appendix B. We also would reference Bulletin 509-S of the Agricultural Experiment Station, Colorado State University titled Meteorological Data 1887-1957, which is a summary of 71 years of meteorological data taken at the experiment station. Should more indepth historical data be desired, this publication will be provided.

M-77-440, PIT #2, INFORMATION FROM EXHIBIT J

Typically these soils have dark brown, clay loam, topsoils; and a dark brown grayish brown, clay loam, subsoils.

Underlying gravel deposits have a mean depth of fifteen (15) feet throughout the site.

(10) Exhibit J - Vegetation Information

The Vegetation Information is dependent upon and coincidental with existing soil conditions. This information is presented as two groups. The first group is "Overflow Range Site" and is representative of vegetation found in areas where the predominant soils are "Riverwash".

This site includes draws, valleys, fans and other lowlands. Slope runs from nearly level to about 5 percent. This site occurs where it receives periodic flooding. Elevation is generally below 6000 ft.

In the potential plant community tall grasses form a major part of the vegetation with mid and short grasses included to make an almost continuous cover. Switchgrass, big bluestem, western wheatgrass, Indiangrass and blue grama are the most abundant species. Prairie sandreed, slender wheatgrass, side oats grama, Canada wildrye, buffalograss, fourwing saltbush and winterfat are present in lesser amounts.

Following are percentages, by weight, of the total annual yield for the potential plant community:

Grasses and Grasslike Plants:	Percent
Switchgrass	10-20
Western wheatgrass	5-25
Big bluestem	5-15
Blue grama	10-20
Indiangrass	T-10

Prairie sandreed	T-10
Sideoats grama	T-10
Slender wheatgrass	T-10
Green needlegrass	T-4
Buffalograss	T-4
Canada Wildrye	T-4
Sedge	T-4
Others	T-4

Forbs:

Others	T-6

Shrubs:

Fourwing saltbush	T-10
Winterfat	T-10
Others	T-4

The total annual yield of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 1,500 pounds per acre in unfavorable years.

Western wheatgrass, blue grama, buffalograss, three-awn, sand dropseed and rabbitbrush are the primary species to increase with the beginning of range depletion. As condition declines further snakeweed, wormwood and annuals invade the site.

Up to 95 percent of the potential vegetation on this site provides forage for cattle.

The second group is "Wet Meadow Range Site". This site is representative of vegetation found in areas where the following soils persist: Paoli Fine Sandy Loam, Loveland Clay Loam, Caruso Clay Loam and Poudre Fine Sandy Loam.

Topography is smooth, nearly level meadows along streams, below permanent springs and in valleys having a high

watertable. Slope ranges from nearly level to less than 3%. Elevation is generally below 6000 ft.

In the potential plant community the vegetation is dominated by tall grasses, principally switchgrass, Indiangrass, prairie cordgrass and big bluestem. Alkali sacaton, western wheatgrass, slender wheatgrass, alkali bluegrass, little bluestem, Canada wildrye, sedges and rushes occur in lesser amounts.

Prairie gentian, vetch, bundleflower, wild rose and wild licorice are also present in small amounts.

Following are percentages, by weight, of the total annual yield for the potential plant community:

Grasses and Grasslike Plants:	Percent
Switchgrass	10-30
Big bluestem	5-15
Prairie cordgrass	5-15
Indiangrass	T-10
Alkali sacaton	5-15
Western & Slender wheatgrass	5-15
Little bluestem	T-10
Alkali bluegrass	T-10
Sedges	T-10
Rushes	T-10
Canada wildrye	T-4
Saltgrass	T-6
Others	T-8
Forbs:	
Wild licorice	T-4
Others	T-6
Shrubs:	
Others	T-2

The total annual yield of air-dry vegetation ranges from 4,000+ pounds per acre in favorable years to 3,000 pounds per acre in unfavorable years. Sedges, rushes, alkali sacaton, bluegrass, saltgrass, foxtail and wild licorice are the primary increasing species with the beginning of range depletion. As condition declines further foxtail and saltgrass increase and dandelion and annuals invade the site.

Up to 90 percent of the potential vegetation on this site provides forage for cattle.

(11) Exhibit K - Climate

The Climatological data for this pit is presented in the "Climatology Report No. 77-1" (Appendix A) for the Fort Collins area which shows means, extremes and durations of temperature ranges on a month by month basis, as well as similar precipitation information.

In addition, an annual wind rose diagram for Fort Collins covering the period 1954-1963 is included as Appendix B. We also would reference Bulletin 509-S of the Agricultural Experiment Station, Colorado State University titled Meteorological Data 1887-1957, which is a summary of 71 years of meteorological data taken at the experiment station. Should more indepth historical data be desired, this publication will be provided.

M-86-049, SEAWORTH PIT, INFORMATION FROM EXHIBIT J

SEARSARTH

(10) Exhibit J - Vegetation Information

The Vegetation Information is dependent upon and coincidental with existing soil conditions. This information is presented as two groups. The first group is "Overflow Range Site" and is representative of vegetation found in areas where the predominant soils are "Riverwash".

This site includes draws, valleys, fans and other lowlands. Slope runs from nearly level to about 3 percent. Elevation is generally 5000 ft.

In the potential plant community tall grasses form a major part of the vegetation with mid and short grasses included to make an almost continuous cover. Switchgrass, big bluestem, western wheatgrass, Indiangrass and blue grama are the most abundant species. Prairie sandreed, slender wheatgrass, side oats grama, Canada wildrye, buffalograss, fourwing saltbush and winterfat are present in lesser amounts.

Following are percentages, by weight, of the total annual yield for the potential plant community:

Grasses and Grasslike Plants:	Percent
Switchgrass	10-20
Western wheatgrass	5-25
Big bluestem	5-15
Blue grama	10-20
Indiangrass	T-10
Prairie sandreed	T-10
Sideoats grama	T-10
Slender wheatgrass	T-10
Green needlegrass	T-4
Buffalograss	T-4
Canada Wildrye	T-4
Sedge	T-4
Others	T-4
Forbs:	
Others	T-6
Shrubs:	
Fourwing saltbush	T-10
Winterfat	T-10
Others	T-4

The total annual yield of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 1,500 pounds per acre in unfavorable years.

Western wheatgrass, blue grama, buffalograss, three-awn, sand dropseed and rabbitbrush are the primary species to increase with the beginning of range depletion. As condition declines further snakeweed, wormwood and annuals invade the site.

Up to 95 percent of the potential vegetation on this site

provides forage.

The second group is "Wet Meadow Range Site". This site is representative of vegetation found in areas where the following soils persist: Paoli Fine Sandy Loam, Loveland Clay Loam, Caruso Clay Loam and Poudre Fine Sandy Loam.

Topography is smooth and nearly level. Slope ranges from nearly level to less than 3%. Elevation is generally below 5000 feet.

In the potential plant community the vegetation is dominated by grasses, principally switchgrass, Indiangrass, prairie cordgrass and big bluestem. Alkali sacaton, western wheatgrass, slender wheatgrass, alkali bluegrass, little bluestem, Canada wildrye, sedges and rushes occur in lesser amounts.

Prairie gentian, vetch, bundleflower, wild rose and wild licorice are also present in small amounts. Following are percentages, by weight, of the total annual yield for the potential plant community:

Grasses and Grasslike Plants:	Percent
Switchgrass	10-30
Big bluestem	5-15
Prairie cordgrass	5-15
Indiangrass	T-10
Alkali sacaton	5-15
Western & Slender wheatgrass	5-15
Little bluestem	T-10
Alkali bluegrass	T-10
Sedges	T-10
Rushes	T-10
Canada wildrye	T-4
Saltgrass	T-6
Others	T-8
Forbs:	
Wild licorice	T-4
Others	T-6
Shrubs:	
Others	T-2

The total annual yield of air-dry vegetation ranges from 4,000+ pounds per acre in favorable years to 3,000 pounds per acre in unfavorable years. Sedges, rushes, alkali sacaton, bluegrass, saltgrass, foxtail and wild licorice are the primary increasing species with the beginning of range depletion. As conditions decline further foxtail and saltgrass increase and dandelion and annuals invade the site.

ADDENDUM - EXHIBIT J - VEGETATION INFORMATION
Response to the CMLRD letter of adequacy of 15 October 1987

6. Your request for consideration of forbs is appropriate. Forbs were considered, however, invasion of forbs is anticipated, especially along completed pond margins. Utilization of forbs will be reconsidered as reclamation progresses over the site in relation to the success and failure of treated areas. If it is determined that the addition of forbs would improve the reclamation effort at that time, a technical revision will be submitted to the CMLRD for approval, and would add forbs to the proposed seeding and planting mixtures.