

Blue Timber Sale Logging Feasibility Report

Notes: Due to the variability of the terrain throughout the sale, there may be the need of intermediate support trees in units not so stated in this analysis. Rigging heights are based on a particular profile and will also differ from given heights throughout each unit. Unless otherwise stated skyline yarding direction will be uphill and Ground Base skidding directions will be downhill. Helicopter yarding will be down hill unless otherwise stated. All skidding and yarding operations will have constraints within stream corridors in all units. See contract provision C6.42# for special yarding and skidding methods. All Ground based skid roads and landings must be approved prior to use. Skid roads will be placed 150' apart.

For skyline operations, a carriage with skyline clamping capability will be required. Unless otherwise stated in the unit comments the Diamond D2000, 42' boom, 7/8" skyline, 5/8 inch mainline and 1/2 inch haulback line will be used with an Eaglet carriage for profile analysis. In those units requiring downhill yarding, the distance between skyline corridors may vary from the standard to accommodate.

In those areas which are recommended for Ground Base systems, and which have slopes in excess of 30%, shovel operations can be considered. Each situation must be approved by the TSO with the cooperation of the zone Geologist.

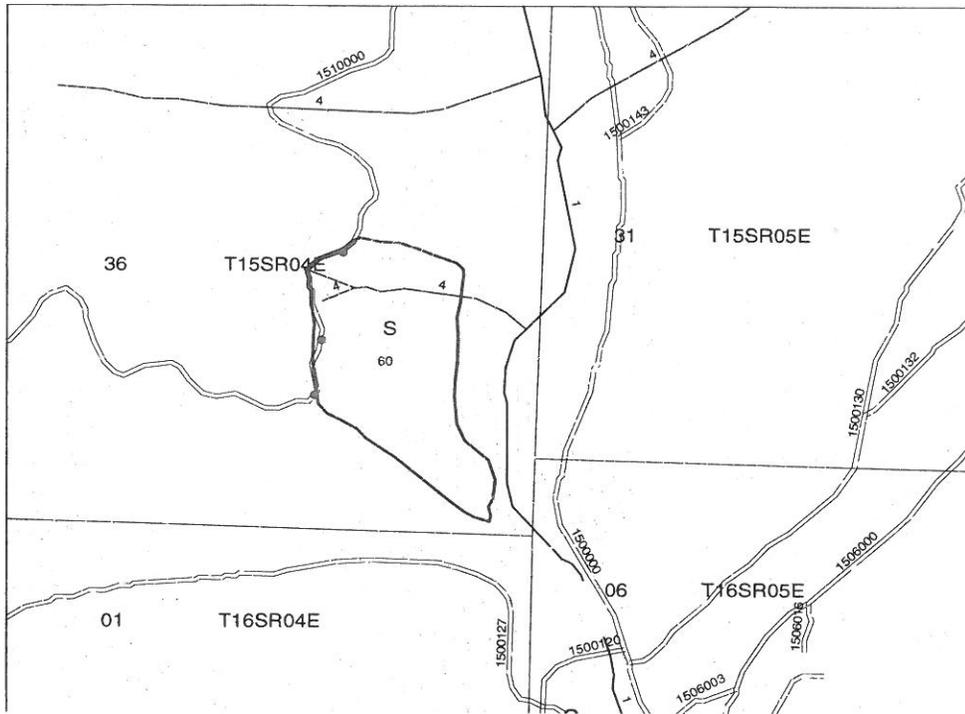
Traditional Ground based equipment is not permitted within Riparian reserves for all stream classes. On class 1, 2, and 3 streams a 60' no harvest buffer with an additional 60' buffer in which ground based equipment will not be permitted. On those units where the afore mentioned streams are present, trees will need to be felled to allow for ground based equipment reach.

Skyline corridors are permitted within stream buffers, however all timber cut in No Harvest Buffers will be left in place. Full suspension will be required when yarding over perennial streams. Where full suspension is not obtainable over intermittent streams, partial suspension is required and limited to that period when the stream is dry.

A light duty Helicopter (payload 4800 lbs) will be used to determine Helicopter logging and economic feasibility for this planning area.

Intermediate support tree and tail spar heights are determined in accordance with OSHA standards and guidelines.

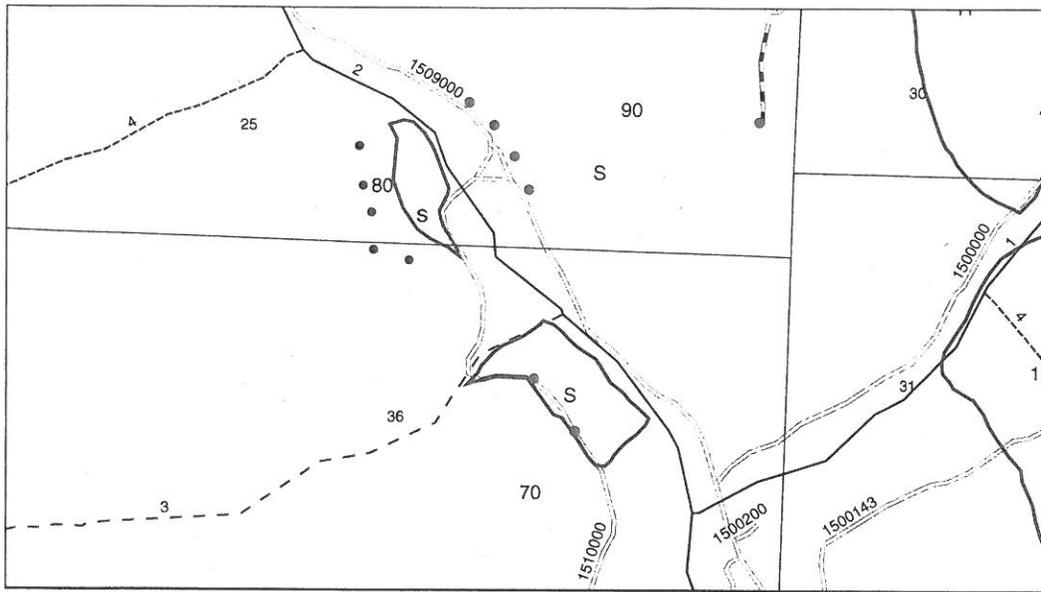
There may be small areas along roads and near landing sites that can be harvested in a manner not specified in the logging plan. With prior approval from the TSO these areas may be harvested using alternate methods of operation.



Unit No: 60 Elevation: 1800 %Slope: 40-55
 Township: 15S Range: 4E Section:

<u>Prescribed System</u>	<u>Acres</u>
S	21

Unit can be skyline yarded. There are two adequate landing sites along the 1510 road with wide enough prism to allow for bunking of logs. There is a class 4 stream running through the unit as well as a class 1 stream along the east boundary at the bottom of the unit. Intermediate supports will be required on some settings. On some settings it may be practical to run the skyline across the class 1 stream which would provide for enough deflection to allow for standing skyline configurations. The falling of trees in the buffer along the class 1 stream should be avoided if possible. Any trees felled will be left in place and not yarded. The timber to the east of the class one stream is more mature timber and will provide for significant tail tree lift. There are good guy anchors and tail trees throughout the unit. The average yarding distance is approx. 400'.



Unit No: 70 Elevation: 1800 % Slope: 30-55

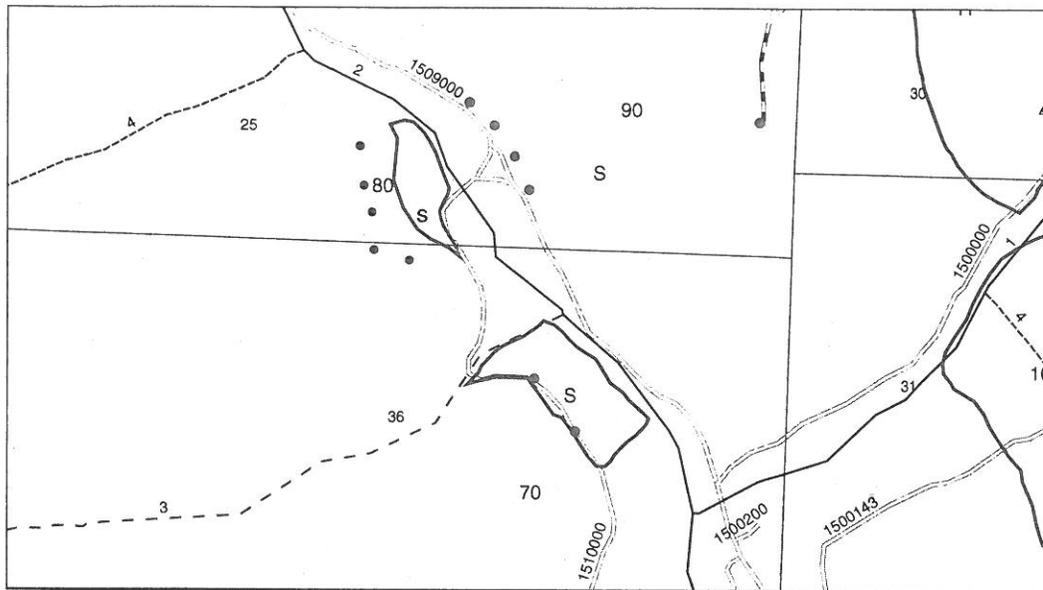
Township: Range: Section:

:

Prescribed System Acres

S 4

The unit has short reaches, max skyline is approx 400' with an average of approx 260. The road prism is narrow along this unit and is well suited for a Yoader type system. 5 or 6 landings with parallel settings. There are good tail lifts along the bottom of the unit. There is also a class 2 stream which runs along the bottom of the unit. There is a stand of mature timber across the stream and above road 1509 which would provide lift if necessary. The average yarding is approx. 200'.



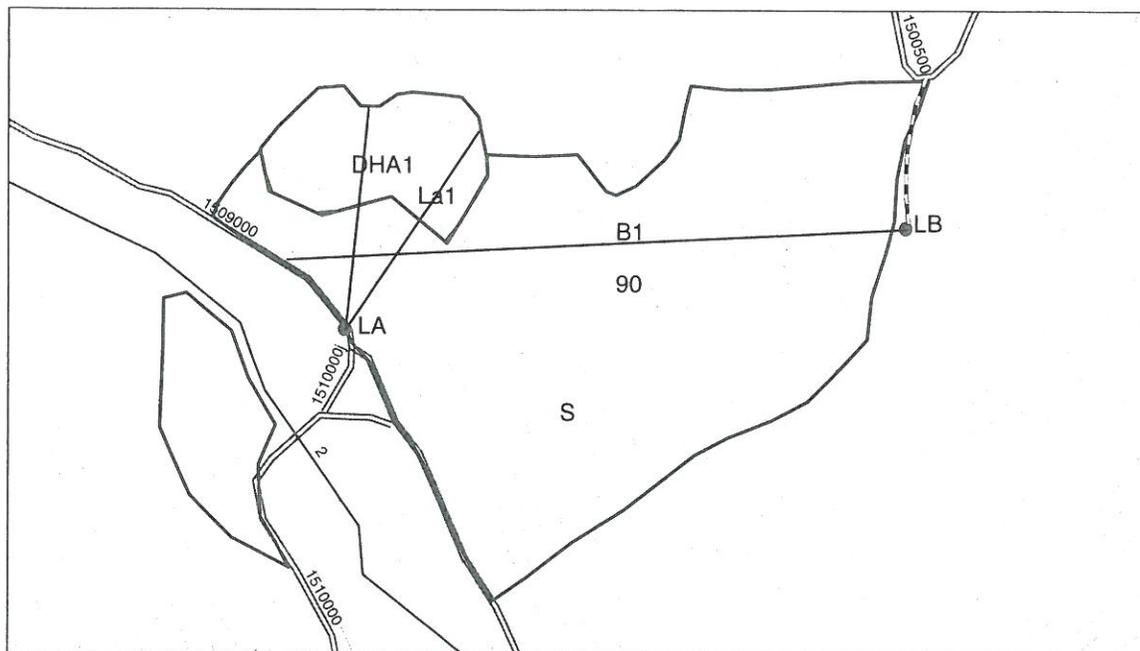
Unit No: 80 Elevation: 1800 %Slope: 15-55

Township: 15S Range: 4E Section: 25

<u>Prescribed System</u>	<u>Acres</u>
S	2

Unit 80 will be downhill yarded to landings along the 1509 road. There is adequate room along the road for 4-5 landings with adequate run-out in front to the yarder. This will allow for parallel settings. The map above showing "dots" above the unit, are mature trees that will provide for adequate lift. The skyline profile shows a standing skyline with 760' of skyline and a 4400 lbs limiting payload.

There is a class 2 stream which will require corridors to access the unit. Full suspension will be required over the stream. There is also a dirt berm along the 1509 road in the area of the northern most landing which may need to be removed to allow for the yarding activities. The average yarding distance is approx. 300'.

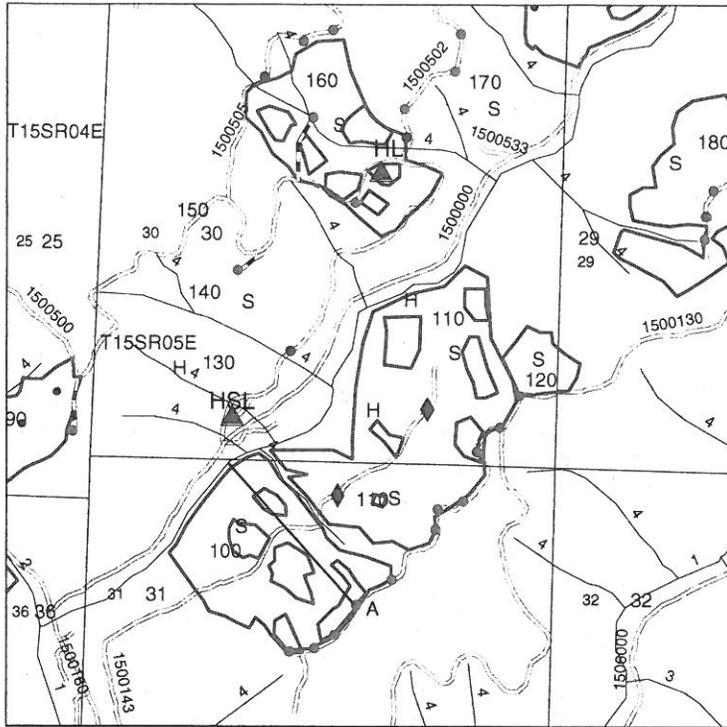


Unit No: 90 Elevation: 2280 %Slope: 10-60

Township: 15S Range: 4E Section:

<u>Prescribed System</u>	<u>Acres</u>
S	25

Unit 90 will have a 350' temp spur coming off the 500 road to access landings for skyline operations. In February of 2014 the stumps in the reprod unit to the east of the temp spur showed adequate residual sap to serve as guylines anchors. The profile for landing "B" shows the need of an intermediate support tree with a rigging height of 30' and a tail lift tree height of 40' for a limiting payload of 2400 lbs. with a skyline length of approx 1800'. This would be the longest reach. Tail trees are good throughout the unit. The piece of ground to the west should be downhill yarded to landing "A". This would also shorten the reach from landing "B" considerably down to lengths of approx. 1500'.
 The average yarding distance is approx. 400'.



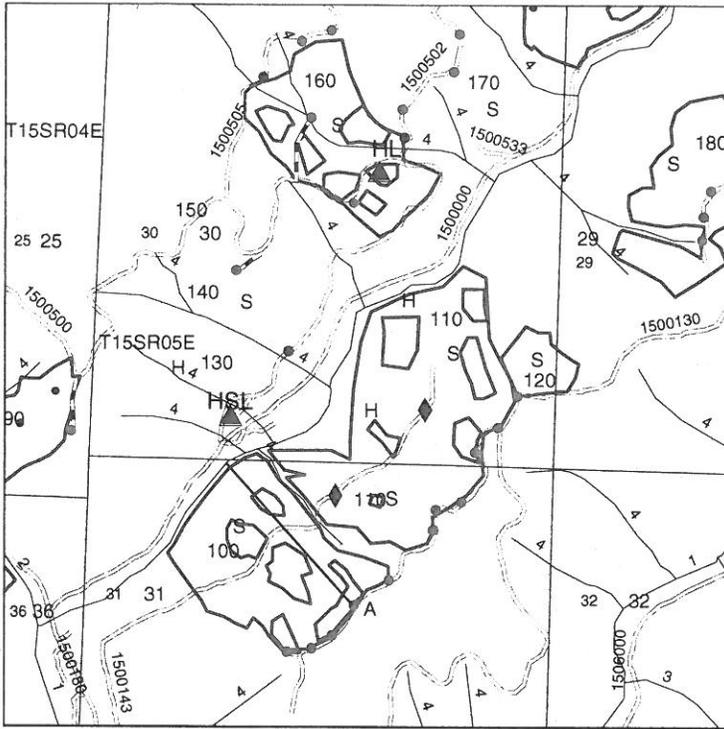
Unit No: 100	Elevation: 2200	%Slope: 30-65
Township:	Range:	Section:
<u>Prescribed System</u>	<u>Acres</u>	
S	30	
H	15	

Unit 100 will be skyline yarded, approx 30 acres, with a portion of the unit to be helicopter yarded approx 15 acres. All skyline yarding will be done to the 1500-134 road. There are numerous turn outs along the road which will provide for landing sites. Some excavation of cut-banks at landing sites may be required to increase the landing size. The 143 road which runs approx mid slope through the unit is inaccessible due to a slide.

The helicopter landings for this unit are across to the north along the 150-500 road in unit 160 designated on the map by triangles. The service landing is just off the 1500 road on the 500, also seen as a diamond on the map. The average flight distance is approx 2500'.

The skyline profile analysis for the unit was taken at the apparent longest reach, the Diamond 2646 yarder was used in the analysis, (shown on map from landing "A"). The profile shows that the required skyline length is 1970' and a 2500 lb payload can be obtain with 40' intermediate and 40' tail spar. Using the analysis program the tail spar could not be placed at the unit boundary and maintain adequate force pound on the intermediate support. Therefore the tail spar has been moved in from the unit boundary approx 50'. If these yarding distances are to long an alternative would be to Heli log the lower portion of the unit along with the 15 acres.

There are several class 4 streams running through the unit. Special yarding objectives will apply. Guyline anchors, intermediate support trees and tail spar trees are good for this unit. The average yarding distance is approx. 800'.



Unit No: 110 Elevation: 2200 % Slope: 30-65

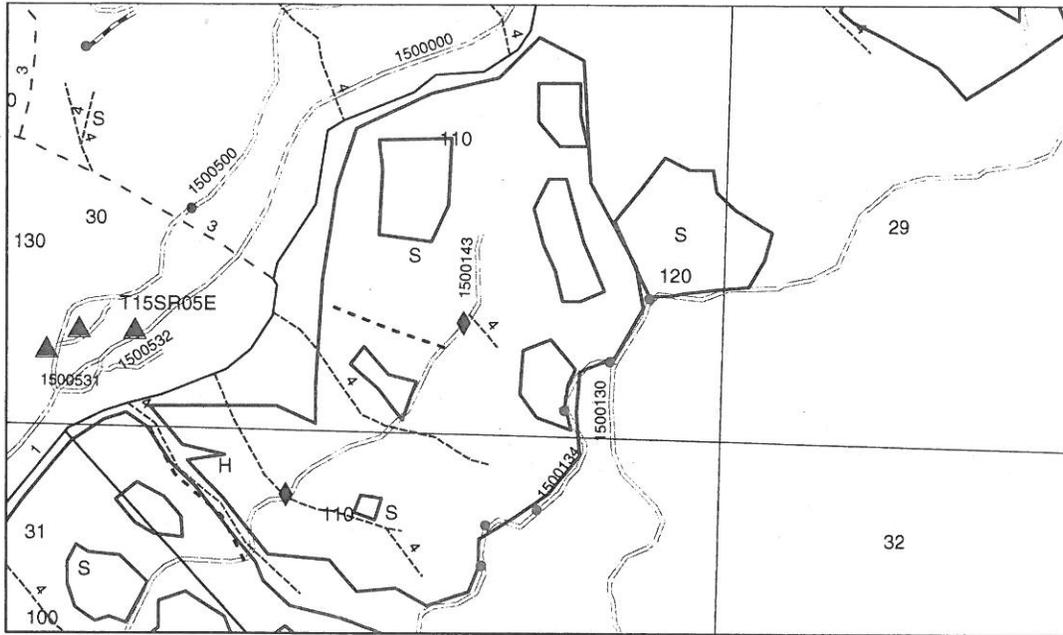
Township: 15S Range: 5E Section: 29, 31

<u>Prescribed System</u>	<u>Acres</u>
S	46
H	22

Unit 110 is a skyline unit to be yarded to the 1500-134. There are numerous turn outs along the 134 road which can serve as landing sites. Some excavation may be require to increase landing sizes. There will be significant skyline reaches in the unit of 1800-1900 feet. The alternative is to Helicopter log the lower portion of the unit. Also the area northwest of the 143 road between the two diamonds (shown on the map) will need to be helicopter logged due to the extreme cliffs along that portion of the road.

The helicopter landings for this unit are to the north along the 1500-500 road. The average flight distance is approx 2500' to the landing in unit 160 shown as a diamond on the map.

The skyline profile analysis for the unit was taken at the apparent longest reach, the Diamond 2646 yarder was used in the analysis, (shown on map from landing "A"). The profile shows that the required skyline length is 1970' and a 2300 lb payload can be obtain with 40' intermediate and 25 tail spar. The average yarding distance is approx. 950'.. Guy anchors and lift trees are adequate in the unit area.



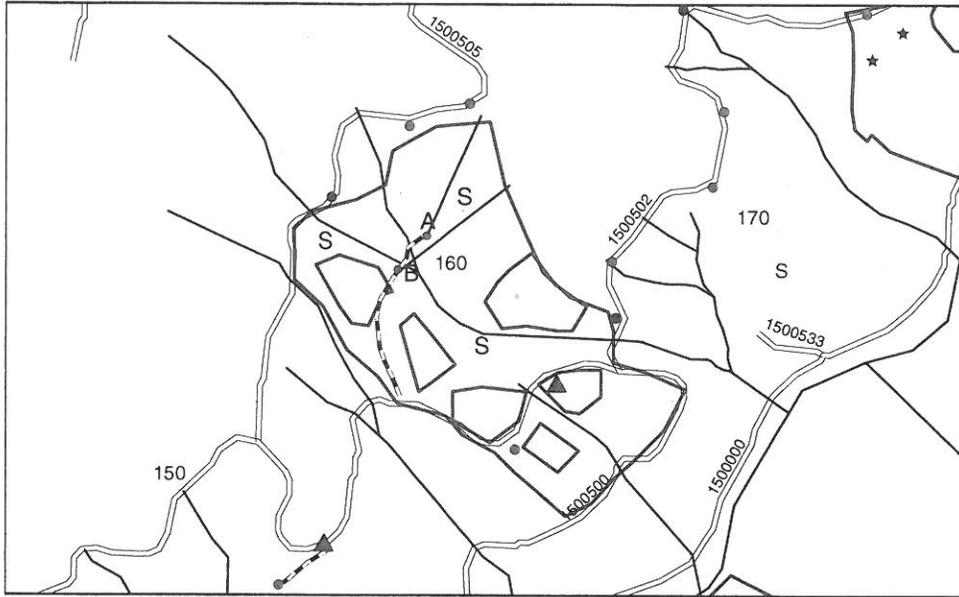
Unit No: 120 Elevation: 2240 %Slope: 30-65

Township: 15S Range: 5E Section: 29, 30

Prescribed System Acres

S 7

Unit 120 is a skyline yarding unit. The maximum skyline length is approx 750' with an average of approx 450'. The timber along the boundaries will provide for adequate lift to allow for standing skyline configuration.

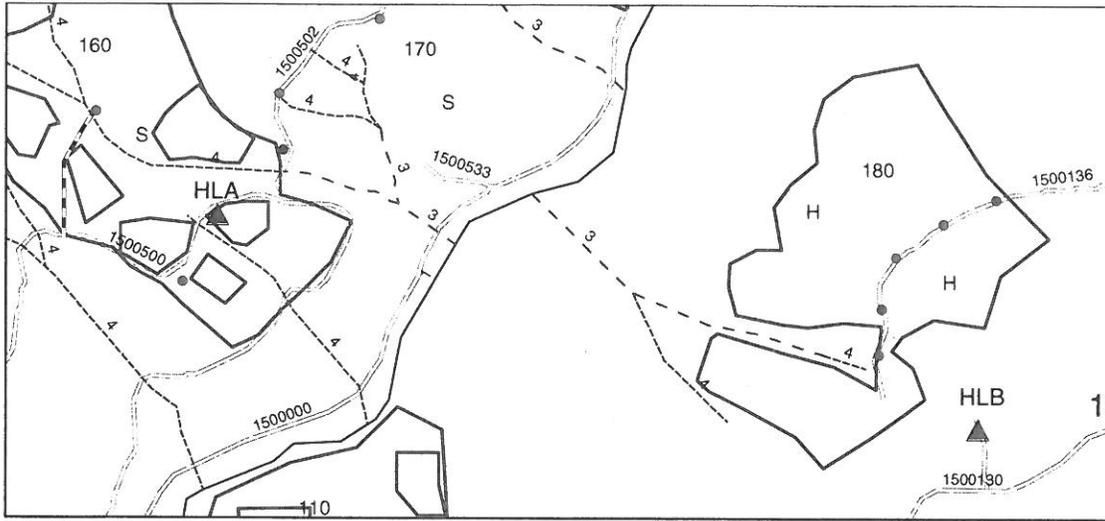


Unit No: 160 Elevation: 2100 %Slope: 5-50 Volume MBF/ac: 12
 Township: 15S Range: 5E Section: 30
 Thinned Canopy %: Spacing:

<u>Prescribed System</u>	<u>Acres</u>
S	34

The skyline yarding portion of the unit will be downhill yarded to the temp spur into the unit off the 1500500 road which will assist in the GB skidding operations. There will be a temporary culvert placement along the temp spur where it crosses the class four stream, this will access landing "A" at the end of the spur. The profiles were run to both landings "A" and "B" and show that a standing skyline can be used. The timber along the north and east boundary is larger and will provide for good tail spars. Both profiles show more than adequate payloads for the unit. The average yarding distance is approx. 350'.

600' TEMP. SPUR



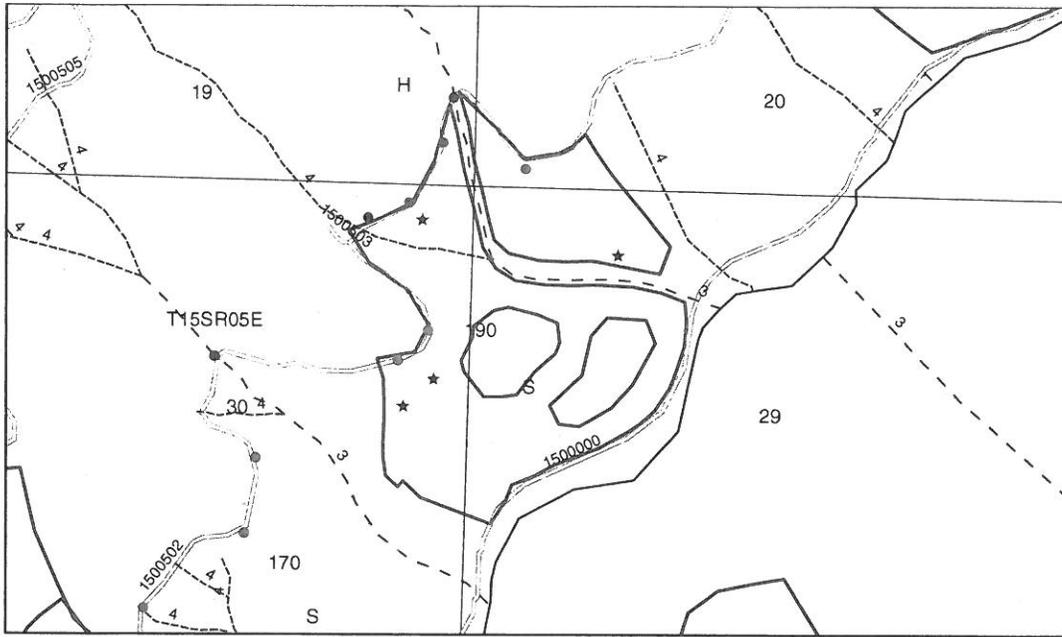
Unit No: 180 Elevation: 2600 %Slope: 15-60

Township: 15S Range: 5E Section: 30

Prescribed System Acres

H 32

Due to unstable ground conditions, the 1500-136 road will not be reconstructed. Therefore this unit will be Heli logged. The midslope elevation of the unit is 2240 feet. The elevation of landing HLA In unit 160, is 1920 feet with a flight distance of approx 3200 feet to midslope of the unit. The elevation of landing HLB is 2480 feet with an approx flight distance of 2500 feet to the midslope center of the unit.



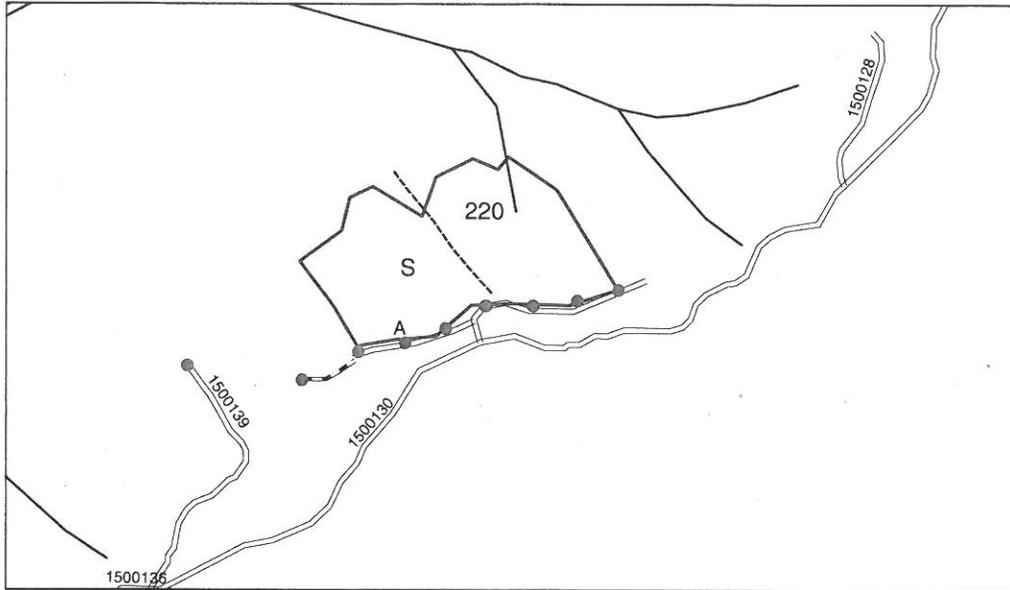
Unit No: 190 Elevation: 2000 %Slope: 40-65

Township: 15S Range: 5E Section: 29, 30

Prescribed System Acres

S 39

The skyline portion can be yarded to the 502 road. The road width is narrow however there are several turnouts that would provide for landing sites for radial settings. The longest yarding distance is approx 1400'. Average yarding distance is approx. 450'.



Unit No: 220

Elevation: 2500

%Slope: 10-50

Township: 15S

Range: 5E

Section: 20, 28, 29

Prescribed System

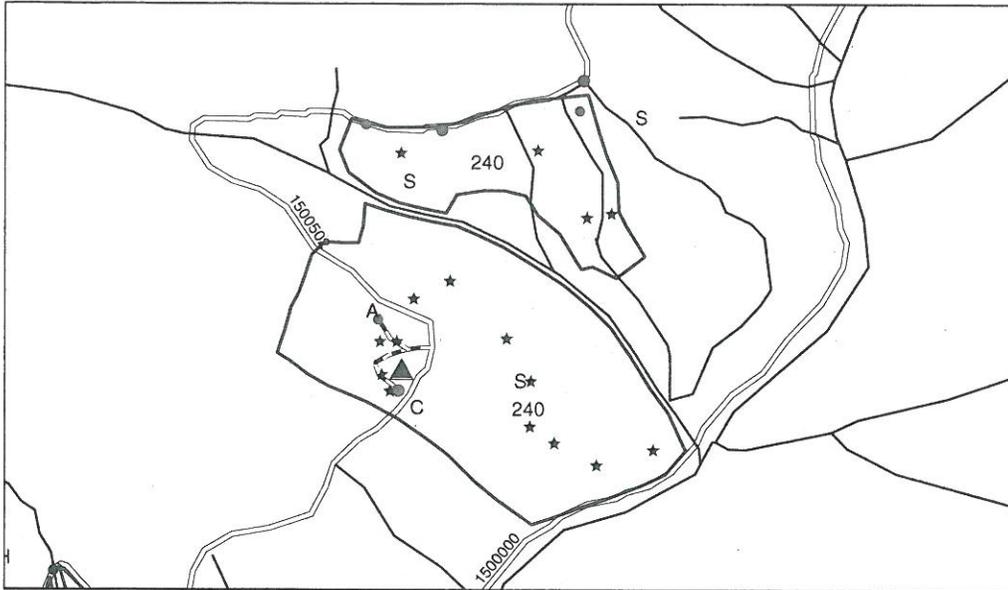
Acres

S

17

The unit is to be yarded to roads 140 and 142. The tail spar trees at the time of the recon (summer of 2008) were small in diameter mostly 14" with scattered 15". The ground is quite broken and intermediate supports are likely to be needed on some corridors. Average yarding distance is approx. 450'.

The temp spur coming out of the eastern portion of unit 220 has a severe approach to the 130 road. Therefore landing "A" (shown on map) will be used for a truck turn around for the unit.



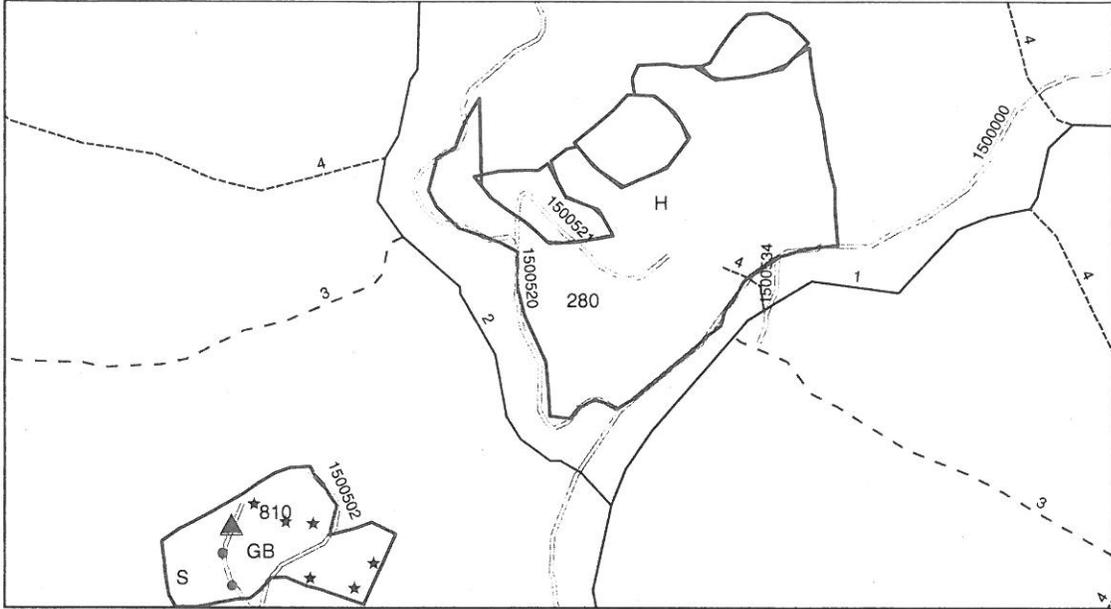
Unit No: 240 Elevation: 2100 %Slope: 5-65

Township: 15S Range: 6E Section: 20

<u>Prescribed System</u>	<u>Acres</u>
S	64

Unit has a proposed temp spur of approx 400' length. The road has two legs, north and south. The south leg goes to a landing site which lies above the 1500-502 road and provides for a better landing with increased deflection than the 502 road would provide. The profile run off landing C is a standing skyline configuration with a 30' tail spar. A yarding distance of 1500' with a payload of 2600 lbs. The western most portion of the unit above the temp spur can be downhill yarded to landings "A" and "C". There is good runout for the operation.

The piece north of the class 3 stream can be logged to the 502 road. Short reaches, 400-650'. The average yarding distance for the unit is approx. 450'.



Unit No: 280 Elevation: 2320 %Slope: 10-50

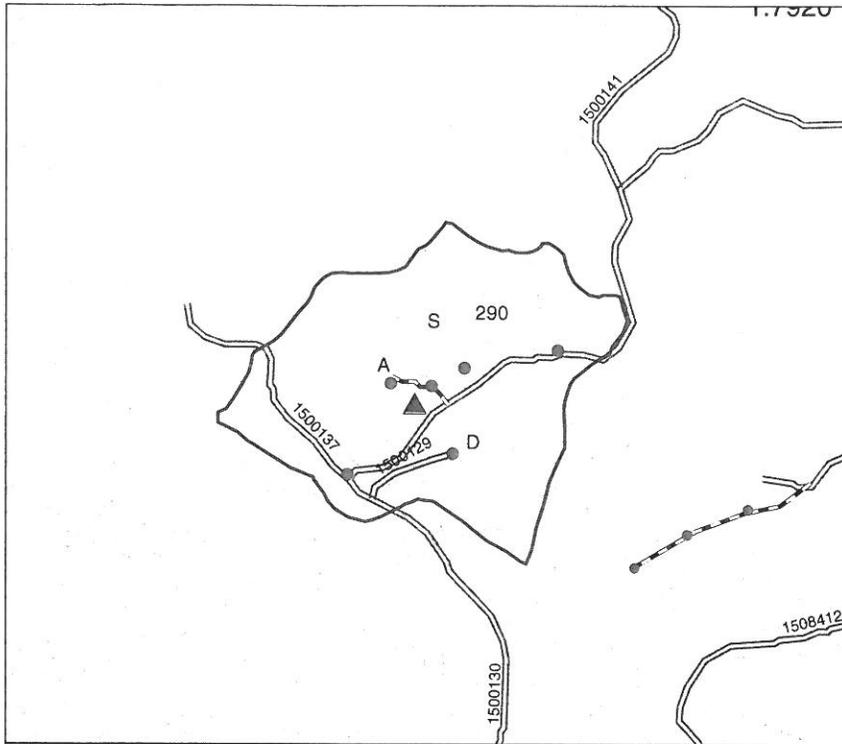
Township: 15S Range: 5E Section: 17, 20

<u>Prescribed System</u>	<u>Acres</u>
--------------------------	--------------

H	56
---	----

Helicopter yarding to be flown to the landing in unit 810, designated by a triangle on the map. The elevation of the landing is approx. 2440', the elevation of the unit at mid-slope is approx. 2000', resulting in slight uphill flight. The average flight distance is approx 2700'. A good portion of the unit is viable for pre-bunching.

Due to extreme slope instability the 1500-521 will not be reconstructed. It is therefore unavailable for use for haul on this unit.



Unit No: 290 Elevation: 2360 %Slope: 0-50

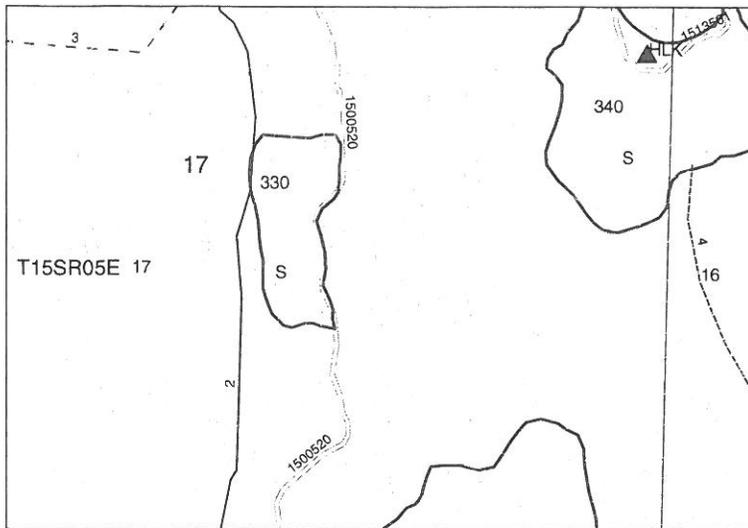
Township: 15S Range: 5E Section: 21

Prescribed System Acres: 37

S 37

There will be a piece of downhill skyline yarding from landing "A" to the SW over road 137. Elevation gain from landing A to the top of the ridge line (the western most corner of the unit) is 200'. Road 137 is narrow and provides no run out for downhill yarding. Alternate would be to fly the piece above road 137 with the heli. Also the southern most piece of ground will be downhill yarded to landing "D". A profile was taken from landing D to the south point of the unit boundary, the longest reach. This will require a 40 foot tail spar, 1150 feet of skyline and 1010 feet of mainline. The tail spar trees running along the unit boundary to the west is larger timber. The tail spar tree running along the unit boundary to the north are smaller but adequate. Average yarding distance is approx. 300'.

300' TEMP SPUR

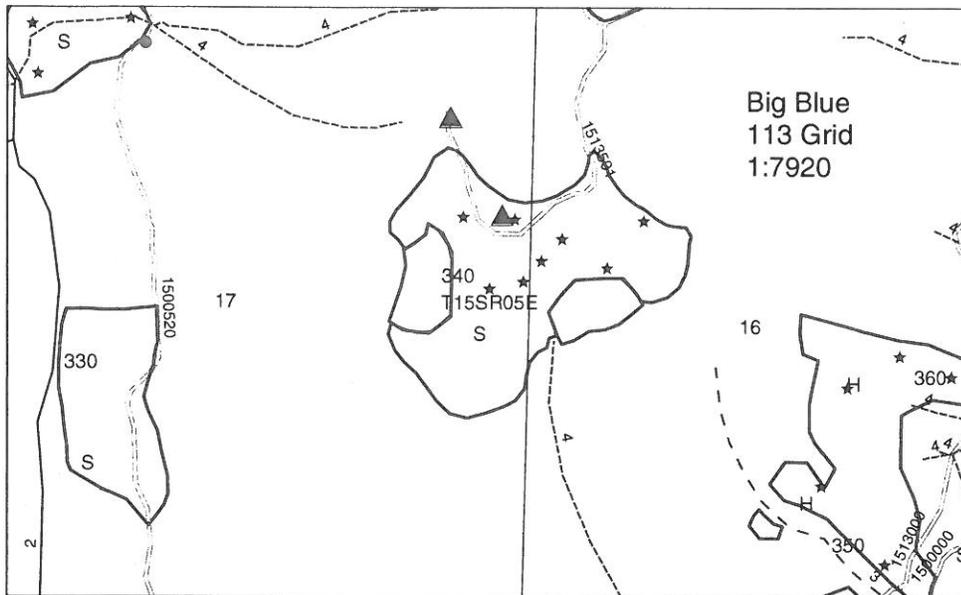


Unit No: 330 Elevation: 2000 %Slope: 20-50

Township: 15S Range: 5E Section: 17

<u>Prescribed System</u>	<u>Acres</u>
S	8

The unit has short reaches, 350'-500'. The timber just west of the unit boundary is bigger and will provide for adequate tail spar trees. The average yarding distance is approx. 200'.



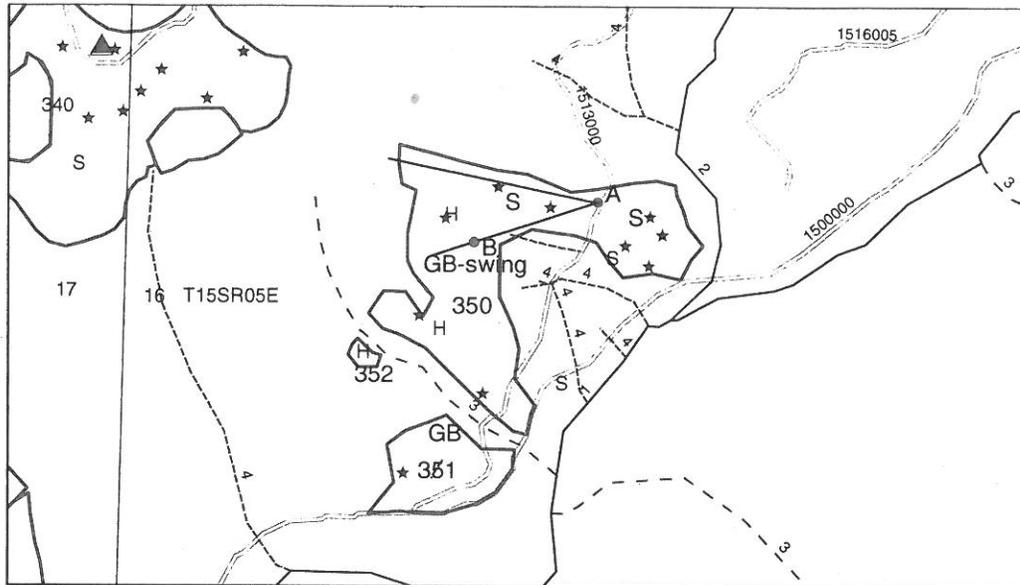
Unit No: 340 Elevation: 2000 %Slope: 5-40

Township: 15S Range: 5E Section: 16, 17

<u>Prescribed System</u>	<u>Acres</u>
--------------------------	--------------

S	24
---	----

Unit is on moderate slopes. Some areas close to road could have the option to be GB skidded. The longest yarding distance is approx 950'. The average yarding distance is approx. 350'.



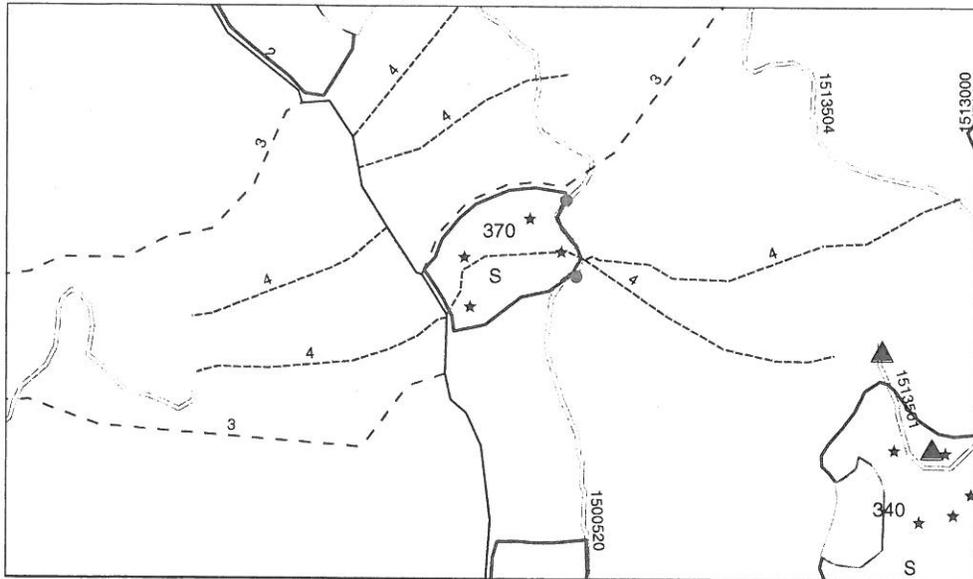
Unit No: 350 Elevation: 2400 %Slope: 10-55

Township: 15S Range: 5E Section: 16

<u>Prescribed System</u>	<u>Acres</u>
H	9
GB	6
S	8

The downhill skyline portion of the unit will have a long reach of approx. 1000'. There is good run-out at the landing sites. There is a flat piece of ground in the middle of the 350 unit shown on the map as, "GB swing to Skl", that will be swung to the skyline landing designated as "B", on the map. The remainder of the unit will be Helicopter yarded to the Landing shown on the map as a Diamond in unit 340. The average flight distance is approx. 2600' and is an uphill flight.

The profile ran on the downhill yarding shows a payload of 8,000 lbs. using a standing skyline with a 30' tail spar. The average yarding distance is approx. 350'.

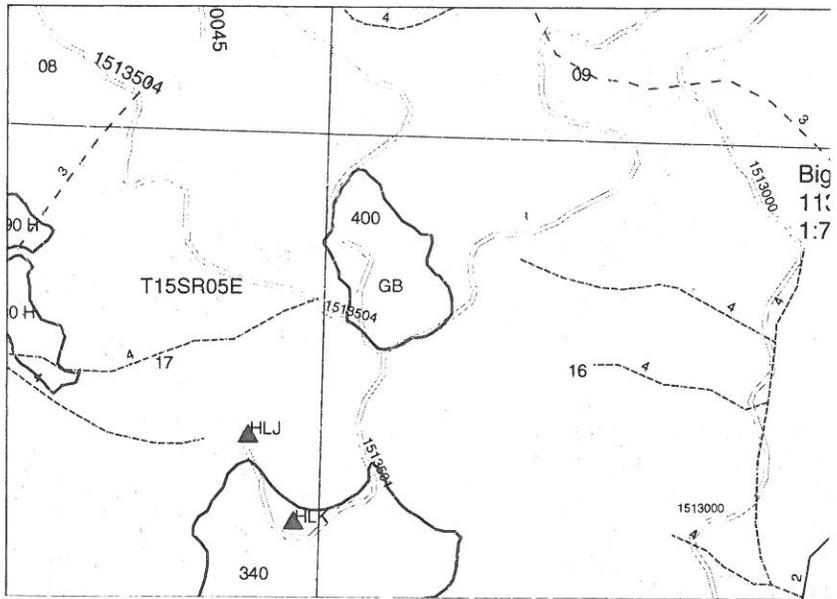


Unit No: 370 Elevation: 2100 %Slope: 25-50

Township: 15S Range: 5E Section: 17

<u>Prescribed System</u>	<u>Acres</u>
S	27

The longest yarding distance is approx 700'. There is a class 4 stream in the unit which would require full suspension when flow is present, partial suspension when not present. Yarding through the corridor can be avoided by placing landings on either side of the stream. Radial settings may work best on this unit due to the limited landing sites. The average yarding distance is approx 300'.



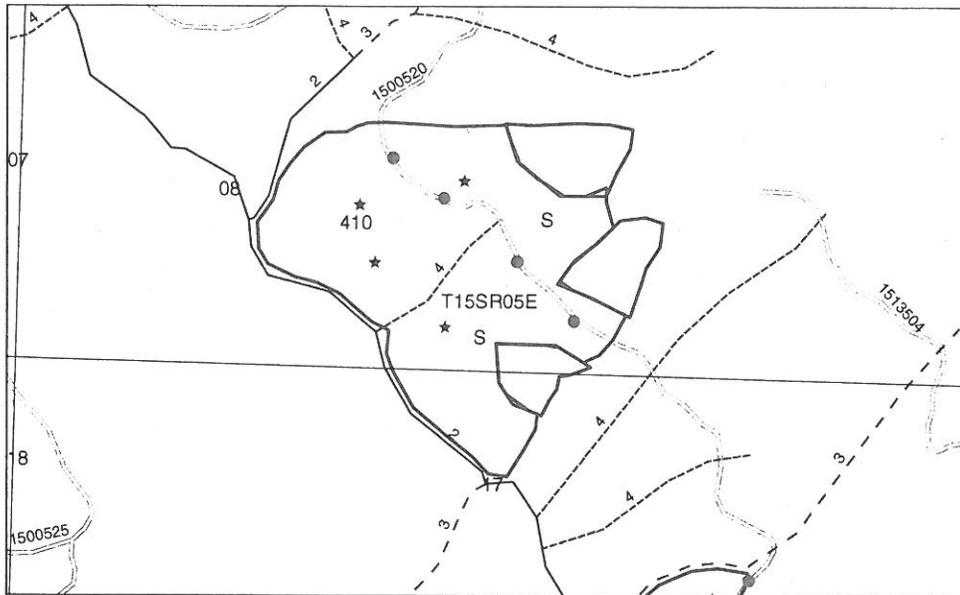
Unit No: 400 Elevation: 2800 %Slope: 0-20

Township: 15S Range: 5E Section: 16

<u>Prescribed System</u>	<u>Acres</u>
--------------------------	--------------

GB	11
----	----

Unit can be skidded to the 1513 road. Main skid trails will be 150' apart. Landing to be designated prior to commencement of skidding operations. The average skid distance is approx. 300'.



Unit No: 410 Elevation: 1960 %Slope: 5-60

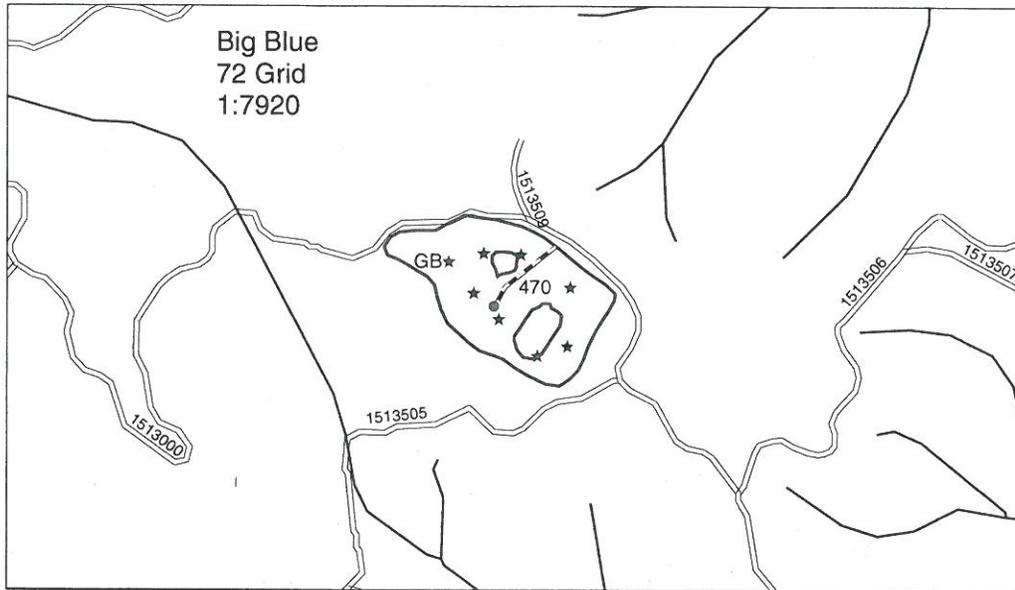
Township: 15S Range: 5E Section: 16

Prescribed System Acres

GB 11

The 1500520 road has good landing sites through the unit, mostly turn outs. The SW portion of the unit will be uphill yarding. The long chord slope is approx 800'. Tail trees at the bottom of the unit will allow for adequate tail spar heights. There is a class 4 stream in the middle of the unit below the road which can be avoided by settings.

The upper piece to the NE has been designed for downhill yarding. The longest skyline length is approx 1140'. Some of the potential tailspars at the top of the unit were measured at 21". Profiles show more than adequate payloads for the downhill. The spacing for the unit should help with the productivity on the downhill. Corridor spacing can be adjusted with prior approval from the TSO. The average yarding distance is approx. 350'.



Unit No: 470

Elevation: 3200

%Slope: 0-15

Township: 15S

Range: 5E

Section: 5

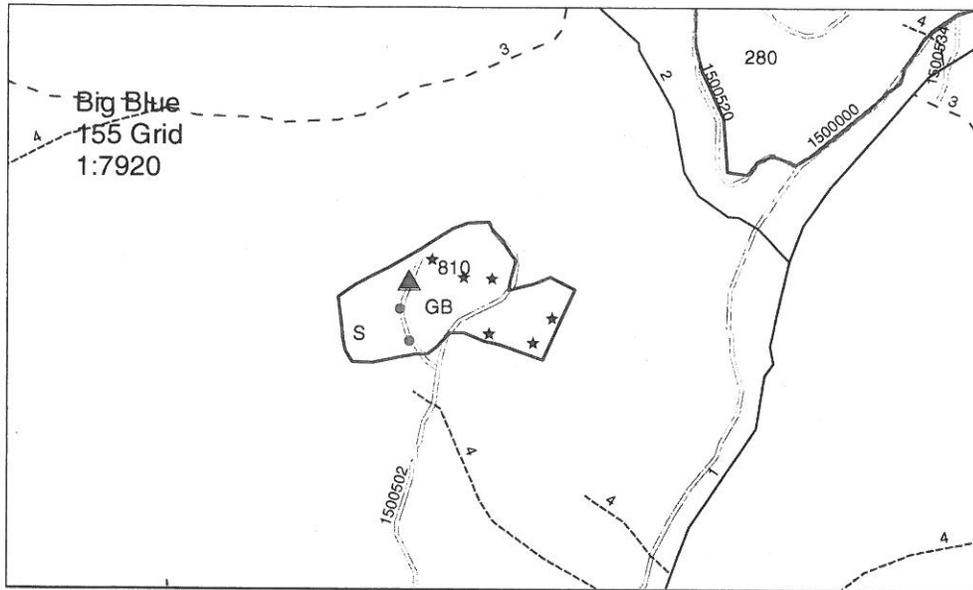
Prescribed System

Acres

GB

11

There is an proposed temp spur into the unit approx 400 feet. This will aid in shortening the skidding distance. There is a open meadow in the unit. The area is buffered out and equipment is prohibited from crossing or entering into the area. Average skid distance is approx. 200'.



Unit No: 810 Elevation: 2560 %Slope: 5-50

Township: 15S Range: 5E Section: 20

<u>Prescribed System</u>	<u>Acres</u>
GB	14
S	5

The skyline portion of the unit will be downhill yarded..Landings can be spaced along the 502 road for parallel settings. The timber along the east boundary is sufficient in size to provide for tail spars. Long yarding distance is approx 450'. Average yarding distance is approx. 200'.