# Specialist Report 11.0
# Transportation Systems

# Oil and Gas Leasing EIS
# on Lands Administered by the
# Dixie National Forest

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# List of Acronyms & Abbreviations

| | |
|---|---|
| **BLM** | Bureau of Land Management |
| **CSU** | Controlled Surface Use |
| **CEA** | Cumulative Effects Area |
| **EIS** | Environmental Impact Statement |
| **GIS** | Geographic Information System |
| **NEPA** | National Environmental Policy Act |
| **NL** | No Lease |
| **NSO** | No Surface Occupancy |
| **RFDS** | Reasonable Foreseeable Development Scenario |
| **SLT** | Standard Lease Terms |

# 11.0 Transportation Systems

## 11.1 Introduction

This Specialist Report has been prepared in support of the Oil and Gas Leasing EIS on Lands administered by the Dixie National Forest, which is an environmental analysis to identify those lands with Federal mineral rights that should or should not be made available for oil and gas leasing. A more detailed description of Purpose and Need is provided in Chapter 1 of the EIS and a description of the Proposed Action, Alternatives, and leasing options is available in Chapter 2. Motorized and non-motorized trails are discussed in Specialist Report 3.0.

The Dixie National Forest transportation system is essential in providing access to and through National Forest System lands. It provides access for the public and administration of land management objectives. The transportation system on the Dixie National Forest provides safe and efficient public and agency access to National Forest System lands. Each system provides a balanced mix of road and trail access for recreation, special uses, management, and fire protection activities while supporting forest management objectives. User experience, safety, and resource protection are emphasized in transportation system planning, design, and operation. The transportation system is efficiently interconnected to state, county, local public, and other federal roads and trails through collaborative access and travel management planning (USDA 2006a).

The transportation system provides the access needed to maintain facilities and infrastructure such as buildings, recreation facilities, municipal water systems, dams, reservoirs, range improvements, mine sites, oil and gas wells, electronic and communication sites, utility corridors, transmission lines, and gas and water lines (USDA 2006a). The roads of a transportation system affect nearly all other resources. Most improvements to existing roads result from the need by forest management for resource development and/or administration of a resource. In planning for the development of a resource, such as oil and gas, a roadway would be used for transportation and to accommodate overland and/or underground pipelines, and communication facilities (USDA 1986).

## 11.2 Consideration of Available Science

The techniques and methodologies used in this analysis consider the best available science. The analysis includes a summary of the credible scientific evidence that is relevant to evaluating reasonably foreseeable impacts. In addition, the analysis also identifies the methods used and references the scientific sources relied on. When appropriate, the conclusions are based on a scientific analysis that shows a thorough review of relevant scientific information, a consideration of responsible opposing views, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

## 11.3 Use of a GIS

Alternatives were developed by assigning the leasing options described in Chapter 2 of the EIS and summarized in Table 2.3-1, to site-specific resource components using geospatial data. Using a geographic information system (GIS), the spatial distribution of each resource component and associated leasing option were overlaid. The most restrictive leasing option (i.e., NL or NSO) assigned to a particular resource component supersedes any less restrictive options (i.e., CSU or SLT) assigned to other resource components that occur in the same area or site-specific location. For example, where NSO was assigned to an area of high erosion potential that coincides with the habitat of a

sensitive wildlife species assigned CSU, the NSO option would be applied to the area common to both of these resources. As a result, multiple stipulations may apply to a resource component, depending upon its location, even if only a single stipulation was specified for that resource component under an alternative. A full range of leasing options were incorporated into the development of alternatives so that the different alternatives would insure that differing levels of protection were addressed for each specific resource component.

Leasing options were applied to geographical areas that represent the spatial distribution of a resource component. However, it is important to note that leasing options are applied to the resource component and not simply to specific geographic areas and if unmapped resource components were identified in the future they would be protected by the same leasing option. Furthermore, the geospatial data used in this analysis is the best GIS data available; however, it comes from multiple sources and was created at varying scales. As a result, it is not assumed that these data are 100 percent complete or that they meet the US National Mapping Accuracy Standard of the Office of Management and Budget. Unless otherwise stated, GIS data was provided by the Dixie National Forest.

## 11.4 Description of Affected Environment

### 11.4.1 Transportation Terms

The following terms will be used throughout this section. They are provided here so that readers may familiarize themselves with common Forest Service transportation terms and give the reader a better understanding of the information contained in this section (USDA 1986).

**National Forest System Road**: A forest road other than a road which has been authorized by a legally documented right of way held by a state, county, or other local public road authority.

**Temporary Road**: Temporary Road: A road necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road and that is not included in a forest transportation atlas.

**Unauthorized Road**: A road that is not a forest road or a temporary road and that is not included in a forest transportation atlas.

**Forest Transportation Atlas**: A display of the system of roads, trails, and airfields of an administrative unit.

### 11.4.2 Road Maintenance Levels

Dixie National Forest roads are maintained to varying standards depending on the level of use and management objectives. Roads may currently be maintained at one level with plans for maintenance at a different level at some future date. The operational maintenance level is the maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns. In other words, it defines the level to which the road is currently being maintained. The objective maintenance level is the maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns. The objective maintenance level may, or may not be, the same as the operational maintenance level. The transition from operational maintenance level to objective maintenance level may depend on reconstruction. There are five maintenance levels used by the Forest Service to determine the work needed to preserve the investment in the road (USDA 2003).

**Level 1:** Basic custodial maintenance is performed to protect the road investment and to keep damage to adjacent resources to an acceptable level. Drainage facilities and runoff patterns are maintained while being maintained at Level 1; roads are administratively closed and sometimes physically blocked to traffic.

**Level 2:** Roads in this maintenance level are normally characterized as single lane, primitive type facilities intended for use by high clearance vehicles. Passenger car traffic is not a consideration. The functional classification of these roads is normally local.

**Level 3:** Roads at this maintenance level are normally characterized as low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. The functional classification of these roads is normally local or minor collector. User comfort is not a consideration at this maintenance level.

**Level 4:** This level is assigned where management direction requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Traffic volumes are normally sufficient to require a double lane aggregate surfaced road. Some roads may be single lane and some may be paved and/or dust abated. The functional classification of these roads is normally collector or minor arterial.

**Level 5:** This level is assigned where management direction requires the road to provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. Functional classification of these roads is normally arterial.

### 11.4.3 State and Federal Highways

Several federal, State, and county roads provide access to the Dixie National Forest (Figure 11.1-1). These roads are not part of the National Forest Service and are not under the management directive of the Forest Service. These roads are under federal and state management and include: Interstate 15, US Highway 89, and State Highways 12, 14, 18, 20, 22, 56, 62, 143, and 148 (USDA 1995).

### 11.4.4 Existing Forest Transportation System

The Dixie National Forest has approximately 3,031 miles of Forest Development Roads (Tables 11.4-1, 2, and 3) on inventory. The Dixie National Forest has 1,379 miles of unauthorized routes that are not part of the Dixie National Forest road system (Table 11.4-2). These routes include old timber sale roads, old mining roads, routes that have never been added to the transportation atlas or authorized system, and user created routes. Collectively these routes are referred to as "unauthorized routes." Some routes such as temporary roads and special use roads are approved by permit, but are not considered part of the Forest road system (USDA 2006a). Table 11.4-3 displays the miles of inventoried road by maintenance level for the Dixie National Forest. The following figures include National Forest System roads only and do not include federal, state, county, and private roads that occur on the Dixie National Forest.

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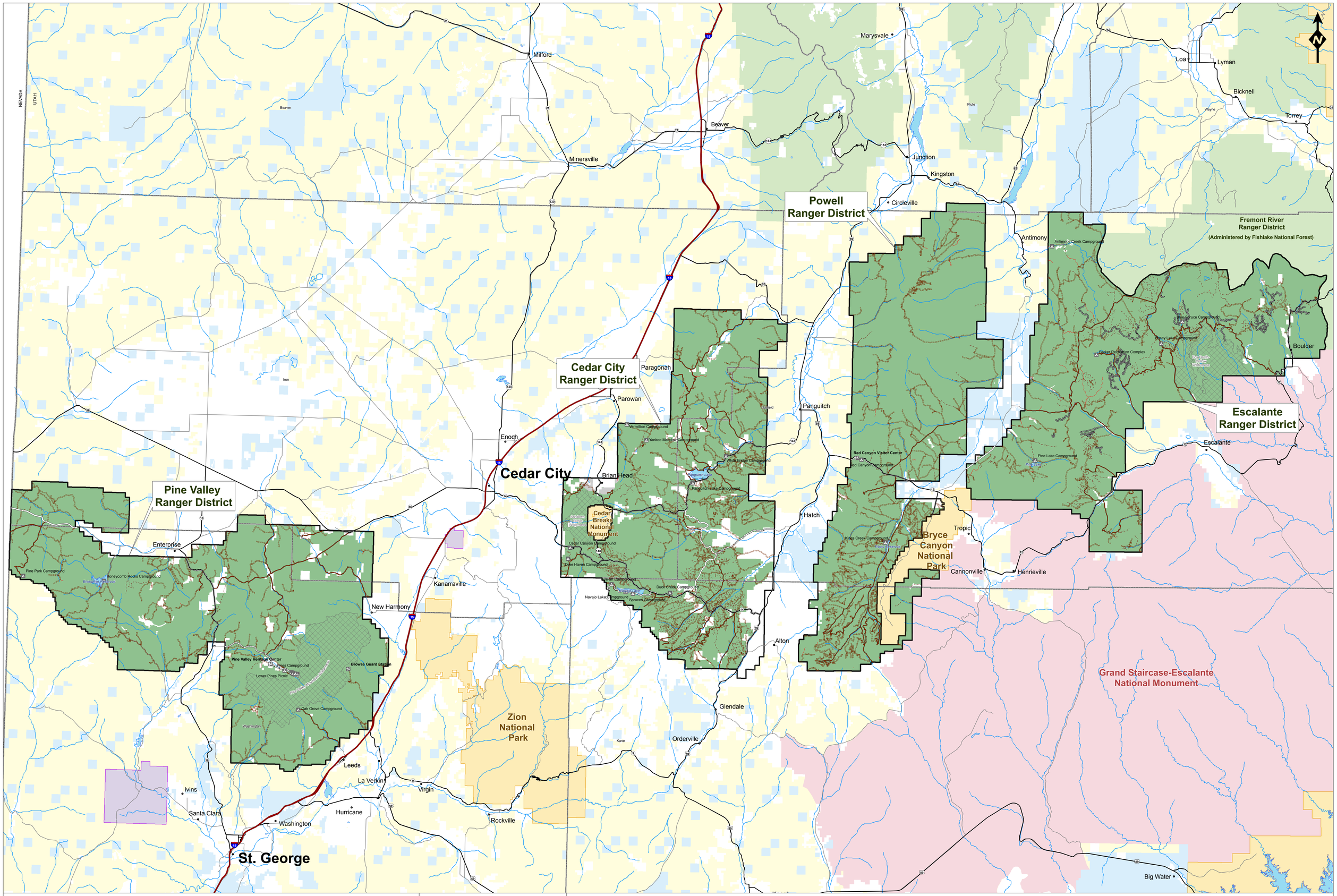
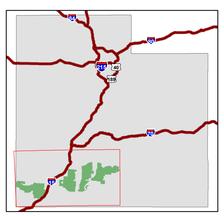



## Oil & Gas Leasing EIS on Lands Administered by the Dixie National Forest

## FIGURE 11.4-1
## Transportation System



### Legend

- Cities

**Forest Sites**
- Campgrounds
- Visitor Centers
- Interstates
- Major Roads
- Minor Roads (1)
- Major Streams & Rivers
- Water Bodies
- County Boundaries
- State Boundaries

**National Forest System Lands**
- Dixie National Forest
- Wilderness Areas
- Fishlake National Forest

**Other Land Administration**
- Bureau of Land Management
- GSENM (2)
- National Park Service
- Private
- State of Utah
- Tribal

**Forest Roads**
**Maintenance Class**
- 1 - BASIC CUSTODIAL CARE (CLOSED)
- 2 - HIGH CLEARANCE VEHICLES
- 3 - SUITABLE FOR PASSENGER CARS
- 4 - MODERATE DEGREE OF USER COMFORT
- 5 - HIGH DEGREE OF USER COMFORT
- 6 - SEASONAL ROAD
- Unauthorized

Miles
0 3 6 9 12

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Accuracy Standard of the Office of Management and Budget. For specific dates and/or additional digital information, contact the Forest Supervisor, Dixie National Forest, Cedar City, Utah. This map has no warranties to its contents or accuracy.

(1) Not all roads are shown. Only some roads are depicted for orientation purposes.
(2) Grand Staircase-Escalanted National Monument. Managed by the Bureau of Land Management.

| | | |
|---|---|---|
| Horizontal Datum = NAD 83<br>Coordinate System = Zone 12N | 1:220,000 | 5 November 2007 |

**Table 11.4-1 Total System Miles by Functional Class.**

| Functional Class | Miles |
|---|---|
| Arterial | 280 |
| Collector | 588 |
| Local | 2,210 |
| **Total** | **3,078** |

**Table 11.4-2 Total System Miles and Unauthorized Miles by Ranger District.**

| Ranger District | System Miles | Unauthorized Miles |
|---|---|---|
| Cedar City | 1,011 | 393 |
| Escalante | 749 | 333 |
| Pine Valley | 467 | 198 |
| Powell | 804 | 455 |
| **Total** | **3,031** | **1,379** |

**Table 11.4-3 Miles of Forest System roads on the Dixie National Forest by Operational Maintenance Level.**

| | Operational Maintenance Level | | | | | |
|---|---|---|---|---|---|---|
| **Ranger District** | **1** | **2** | **3** | **4** | **5** | **Total** |
| Cedar City | 84 | 753 | 140 | 19 | 15 | 1,011 |
| Escalante | 226 | 423 | 145 | 0 | 0 | 794 |
| Pine Valley | 9 | 364 | 87 | 8 | 0 | 468 |
| Powell | 27 | 694 | 75 | 9 | 0 | 805 |
| **Total** | **346** | **2,234** | **447** | **36** | **15** | **3,078** |

### 11.4.5 Existing Oil and Gas Roads

Most oil and gas roads are not physically closed to the general public and are classed as local roads. Roads from the local roads that provide access to individual well sites or tank batteries are managed under the field development plan. None of the roads within this production field are managed under special use permits. Oil pipelines and power lines which extend beyond the production field are covered by special use permits issued to the oil and gas leaseholders. The roads to the individual well sites or batteries are typically reclaimed or managed as intermittent service facility after they are no longer needed for oil and gas activity. Intermittent service roads are closed to traffic, graded, and maintained for drainage; those with native surfacing are scarified and seeded during reclamation. Reclaimed oil and gas roads are rehabilitated to near-natural condition (USDA 1995). Most of the existing oil and gas roads were permitted and opened in the late 1960's and are not typical of current Forest management.

### 11.4.6 Traffic Volume

The Utah Department of Transportation collected traffic statistics on State Highway road sections throughout Utah during 2004-2006 (UDOT 2006). These data are summarized below by Ranger District.

**Table 11.4-4 Annual Average Daily Traffic on Utah Highways occurring on the Dixie National Forest (UDOT 2006).**

| Highway | Pine Valley | Cedar City | Powel | Escalante |
|---|---|---|---|---|
| State Highway 18 | 1,640 | | | |
| State Highway 14 | | 838 | | |
| State Highway 148 | | 527 | | |
| State Highway 143 | | 820 | | |
| US Highway 89 | | 1,398 | | |
| State Highway 12 Red Canyon | | | 2,442 | |
| State Highway 12 Upper Valley | | | | 1,190 |
| State Highway 12 Boulder | | | | 547 |

### 11.4.7 Gravel Sources

Gravel sources on the Dixie National Forest are not readily available. An active gravel pit exists on the Pine Valley Ranger District near Enterprise; this pit is used as a gravel source for Forest roads. Three small gravel pits occur on the Cedar City District, but the source material has nearly all been removed. Gravel sources are more readily available on lower elevation, Bureau of Land Management (BLM) lands adjacent to the Forest.

### 11.4.8 Pine Valley Ranger District

Main access through the Pine Valley Ranger District is via the following roads (USDA 1995): State Highway 18 (St. George to Beryl Junction), Interstate 15 (St. George to Cedar City), and State Highway 56 (Cedar City to Beryl Junction). Miles by Maintenance Level are provided in Table 11.4-1. Annual Average Daily Traffic on Highway 18 through the Pine Valley Ranger District from Central to Enterprise during the period 2004 – 2006 was 1,640 (UDOT 2006).

### 11.4.9 Cedar City Ranger District

Main access through the Cedar City Ranger District is via the following roads (USDA 1995): Interstate 15 (Cedar City to State Highway 20), US Highway 89 (Glendale to State Highway 20), State Highway 143 (Parowan to Panguitch), State Highway 148 (State Highway 14 to State Highway 143 through Cedar Breaks NM), State Highway 14 (Cedar City east to US Highway 89), and State Highway 20 (Interstate 15 to US Highway 89). Miles by Maintenance Level are provided in Table 11.4-1. Annual Average Daily Traffic on State Highway 14 through the Cedar City Ranger District from the western boundary to the Iron – Kane County border during the period 2004 – 2006 was 838, on Highway 148 from State 14 to Cedar Breaks National Monument was 527, on Highway 143 was 820, and on Highway 89 from Glendale to Hatch was 1,398 (UDOT 2006).

### 11.4.10 Powell Ranger District

Main access through the Powell Ranger District is via the following roads (USDA 1995): State Highway 89 (Glendale to State Highway 20), State Highway 20 (Interstate 15 to State Highway 89), State Highway 12 (US Highway 89 to Torrey), State Highway 22 (Otter Creek Reservoir to State Highway 12), and State Highway 62 (US Highway 89 to Otter Creek Reservoir). Miles by Maintenance Level are provided in Table 11.4-1. Annual Average Daily Traffic on State Highway 12 through the Powell Ranger District during the period 2004 – 2006 was 2,442 (UDOT 2006). Much of this traffic is likely associated with visitation to Bryce Canyon National Park. Average annual visitation at the Park during the period 1997 – 2006 was 1,027,638 (NPS 2007).

### 11.4.11 Escalante Ranger District

Main access through the Escalante Ranger District is via the following roads (USDA 1995): State Highway 12 (US Highway 89 to Torrey), State Highway 22 (Otter Creek Reservoir to State Highway 12), and State Highway 62 (US Highway 89 to Otter Creek Reservoir). Miles by Maintenance Level are provided in Table 11.4-1. Annual Average Daily Traffic on State Highway 12 through the Escalante Ranger District from Henrieville to Escalante during the period 2004 – 2006 was 1,190 and through Boulder was 547 (UDOT 2006).

## 11.5 Impact Analysis

This section describes the changes to the human environment that could occur as a result of implementing the Alternatives outlined in Chapter 2. Changes to the human environment are described using the terms "effect" and "impact," which are synonymous under NEPA. Effects may be direct, indirect, or cumulative in nature.

- Direct effects occur at the same time and place as the action.
- Indirect effects are reasonable foreseeable effects that occur later in time or are removed in distance from the action.
- Cumulative effects are those impacts to the environment that result from the incremental impacts of an alternative when added to other past, present, and reasonably foreseeable future actions.

In this Specialist Report, the direct and indirect effects of an action are discussed in combination for the affected resource components in Section 10.2.4. Cumulative effects are described in Section 10.2.5.

NEPA requires that effects be discussed in terms of context and intensity. In this Specialist Report, context refers to the location, type, or size of the area to be affected relative to each resource component. Intensity refers to the severity or level of magnitude of impact. In this Specialist Report, the intensity of effects is defined as Major, Moderate, Minor, or Negligible. In addition, the duration of effects can be temporary, short term, or long term. These terms are described more specifically in Table 10.2-1.

### Table 11.5-1 Summary of Terms used to Describe Effects in the Specialist Report.

| Attribute of Effect | | Description |
|---|---|---|
| Quality | Beneficial | An improvement of current conditions. |
| | Adverse | A degradation of current conditions. |
| Magnitude (Intensity) | Negligible | No measurable change in current conditions. |
| | Minor | A small, but measurable change in current conditions. |
| | Moderate | A moderate, measurable change in current conditions. |
| | Major | A big, easily measurable change in current conditions. |
| Duration | Temporary | Short-lived (i.e., during construction). |
| | Short-term | 10 years or less. |
| | Long-term | More than 10 years. |

### 11.5.1 Connected Actions

Connected actions are defined by the Council on Environmental Quality (CEQ 1508.25) as actions that: 1) automatically trigger other actions which may require environmental impact statements; 2) cannot or will not proceed unless other actions are taken previously or simultaneously, and; 3) are interdependent parts of a larger action and depend on the larger action for their justification. Forest Service regulations (36 CFR 228.102(c)(4)) require the Forest Service to consider the subsequent actions that would be authorized by a lease as connected actions. Connected actions are the basis of the environmental analysis from which leasing decisions would be made. In this Specialist Report, connected actions are the predicted disturbance from oil and gas leasing activity, which is discussed in Chapter 2 of the EIS.

### 11.5.2 Issue Statement

*Post-leasing activities could increase traffic levels on public roads and Forest roads and increase accessibility to other federally-administered lands.*

Construction and operation of oil and gas facilities could impact the existing transportation system in terms of expanding the road system, increasing maintenance costs, impacting public access, and creating safety concerns. Post-leasing activities could increase the need for gravel sources. Construction of new roads near National Park Service lands could create avenues of inappropriate use (off highway vehicle use, wood gathering, poaching) of National Park Service lands.

### 11.5.3 Indicators

In this Specialist Report, effects will be described using indicators developed for each resource. Using the environmental conditions described in Section 11.4 as a baseline, indicators are used to predict or measure change in a resource related to effects of the Alternatives. Some indicators are quantitative and measure effects based on numerical thresholds, while other indicators involve a narrative to qualitatively describe any changes relevant to baseline conditions.

<u>Measurement indicators</u>

- Estimated traffic increase
- Miles of road construction and reconstruction (long- and short-term)
- Determine the potential gravel quantities needed

### 11.5.4 Direct and Indirect Effects

#### 11.5.4.1 Description of leasing options

No resource components or leasing options were identified specifically for the transportation resource. Effects of road building by leasing options assigned to other resources are described in other Specialist Reports.

#### 11.5.4.2 Impacts of connected actions under SLT

The impacts of connected actions under the Reasonable Foreseeable Development Scenario (RFDS) are discussed in this section, assuming no restrictions or stipulations on oil and gas activities other that those listed on BLM form 3100-11 (SLT, BLM 2006), the Gold Book (USDA and BLM 2007) and those documents referenced within, and the Dixie National Forest Oil and Gas Construction and Operating Standards and Well Site Design Requirements (Appendix 11B).

Impacts to county and Forest roads would primarily include construction or reconstruction of roads, maintenance of new and existing roads, and increased levels of traffic using these roads. Increases in traffic volume, especially related to increases in the number of large vehicles (e.g., semi trucks, etc.), can increase maintenance costs and create additional safety concerns (e.g., large vehicles entering highways). Maintenance of new and reconstructed roads would be the responsibility of the lessee. Construction of new roads could provide access for inappropriate use of National Park Service Lands; however, new roads would be gated and only used for oil and gas related activities. Any new road added to the system (production) would first undergo NEPA analysis and any temporary roads (exploration) would be removed and rehabbed.

Beneficial impacts could include improvement of existing roads (such as adding or improving drainage, grading, improving surface condition) and overall improvement of the transportation system (i.e., planning road locations and types efficiently to meet access needs). Adverse impacts related to surface disturbance, removal of vegetation, erosion, wildlife collisions, Inventoried Roadless Areas, changes in air quality and fragmentation of wildlife habitats are discussed in the other Specialist Reports.

- *Measurement Indicator #1* ESTIMATED TRAFFIC INCREASE

**EXPLORATION DRILLING**

For this EIS we are using the Fishlake National Forest's estimated traffic volumes by type that was created in support of their oil and gas leasing EIS. This information, currently in draft form, is provided as Appendix 11A. Traffic volume is directly correlated to estimated size of drill pads and amount of road construction/reconstruction. Estimated pad size for the Fishlake National Forest is the same (5.9 acres) as for the Dixie National Forest. The amount of new road construction per drill pad estimated on the Fishlake National Forest is 0.09 miles more than on the Dixie National Forest and the amount of reconstruction is 1.32 miles less, respectively. Although minor differences exist between the two Forests, these data are the best available and more applicable than UDOT (2006).

In summary, it is estimated that total one-way traffic volume would be up to 1,924 trips per exploration well. The RFDS (BLM 2007) estimates 60 total exploration wells on the Dixie National Forest over a 15-year period. Total estimated traffic volume for these exploration wells is presented in Table 11.5-2. For the purpose of this analysis, it is estimated that it would take 120 days to complete each exploration well, including initial reclamation, exploration drilling activities (personal communications, e-mail, Carter Reed, US Forest Service, 31 October 2007). Average daily traffic per exploration well is thus estimated to be 16 trips. The RFDS (BLM 2007) predicts 4 exploration wells on the Dixie National Forest per year. Average daily traffic volume associated with exploration wells would thus range from 0, when no drilling is occurring, to 64 one-way trips if all 4 exploration wells were active at the same time. Although unlikely, it is assumed for this analysis that all 4 exploration wells would be active at the same time each year and that associated traffic would occur on all Highways. Under this extreme scenario, average daily traffic volume would increase from between 3 percent and 12 percent on the Dixie National Forest as a result of exploration drilling (Table 11.5-3). In terms of maintenance costs and public safety, this increase would be short-term (120 days) and negligible to minor intensity.

**Table 11.5-2 Total Estimated Exploration Traffic Volume**

| Ranger District | One-Way Traffic Volume |
|---|---|
| Cedar City | 28,860 |
| Escalante | 38,480 |
| Pine Valley | 9,620 |
| Powell | 38,480 |
| **Total** | **115,440** |

**Table 11.5-3 Estimated percent increase in average daily traffic volume during exploration drilling, assuming that 4 wells would be active at the same time and that associated traffic would occur on all highways.**

| Highway | Pine Valley | Cedar City | Powell | Escalante |
|---|---|---|---|---|
| State Highway 18 | 4% | | | |
| State Highway 14 | | 8% | | |
| State Highway 148 | | 12% | | |
| State Highway 143 | | 8% | | |
| US Highway 89 | | 5% | | |
| State Highway 12 Red Canyon | | | 3% | |
| State Highway 12 Upper Valley | | | | 5% |
| State Highway 12 Boulder | | | | 12% |

**PRODUCTION FIELD DEVELOPMENT**

It is estimated that total one-way traffic volume would be up to 6,884 trips for development of a 20-well production field (Appendix 11A). For the purpose of this analysis, it is estimated that it would take at least 2 years (520 working days) to complete field development (personal communications, e-mail, Carter Reed, US Forest Service). Average daily traffic is thus estimated to be 13 one-way trips during the production field development stage. The RFDS (BLM 2007) estimates the development of one production field on the Dixie National Forest. For the sake of this analysis, it is assumed that a 20-well production field would be developed in each Ranger District. Average daily traffic volume would increase from 1 percent to 2 percent on the Dixie National Forest as a result of field development (Table 11.5-4). In terms of maintenance costs and public safety impacts as a result of increased traffic and large vehicles pulling onto highways, this increase would be short term (2 to 3 years) and negligible.

**Table 11.5-4 Estimated percent increase in average daily traffic volume during production field development, assuming that one field is developed in each Ranger District and that associated traffic would occur on all Highways.**

| Highway | Pine Valley | Cedar City | Powell | Escalante |
|---|---|---|---|---|
| State Highway 18 | 1% | | | |
| State Highway 14 | | 2% | | |
| State Highway 148 | | 2% | | |
| State Highway 143 | | 2% | | |

| | | | | |
|---|---|---|---|---|
| US Highway 89 | | 1% | | |
| State Highway 12 Red Canyon | | | 1% | |
| State Highway 12 Upper Valley | | | | 1% |
| State Highway 12 Boulder | | | | 2% |

**FIELD OPERATIONS**

Once a field was developed, estimated average daily one-way traffic volume would be up to 15 trips for field operation (Appendix 11A). Average daily traffic volume increase would be similar to development (Table 11.5-3). In terms of maintenance costs and public safety, this increase would be long term (30 years) and negligible.

**ABANDONMENT AND RECLAMATION**

It is estimated that total one-way traffic volume would be up to 902 trips for field abandonment and reclamation (Appendix 11A). For the purpose of this analysis, it is estimated that it would take three years (780 working days) to complete abandonment and reclamation activities (personal communications, e-mail, Carter Reed, US Forest Service). Average daily traffic is thus estimated to be 1 to 2 one-way trips during the abandonment and reclamation stage. In terms of maintenance costs and public safety, this increase would be short-term (3 years) and negligible.

- *Measurement Indicator #2* MILES OF ROAD CONSTRUCTION AND RECONSTRUCTION

It is estimated that an average of 0.66 miles of new road construction and 3.92 miles of road reconstruction would be needed for each exploration well. It is also estimated that 9.5 miles of new spur roads would be needed for a production field (BLM 2007). Across the Ranger Districts, the percent increase in miles of Forest System roads over baseline would range from 6.9 percent to 13.5 percent (Table 11.5-5). Actual increases would be somewhat less as roads would be constructed over a 15-year period and in any year following the first exploration well, earlier exploration roads would be reclaimed and removed from the transportation network. Impacts to the existing transportation network would be short- to long-term depending on location of the road and success of reclamation for exploration roads. For production, impacts would be long-term as the roads would be in existence for at least 10 years. The 284.3 miles of new road construction/reconstruction would not greatly augment (9.2 percent) the 3,078 miles of system roads already existing on the Dixie National Forest, or by Ranger District; impacts would be minor.

### Table 11.5-5 Estimated miles of new road construction and road reconstruction over a 15-year period by Ranger District.

| Ranger District | Wells | New Road Construction Exploration Drilling | Road Recon-struction Exploration Drilling | New Spur Road Construction Production Field | Total Road Construction/ Reconstruction | Percent Increase Over Existing |
|---|---|---|---|---|---|---|
| Pine Valley | 5 | 3.3 | 19.6 | 9.5 | 32.4 | 6.9% |
| Cedar City | 15 | 9.9 | 58.8 | 9.5 | 78.2 | 7.7% |
| Powell | 20 | 13.2 | 78.4 | 9.5 | 101.1 | 12.6% |
| Escalante | 20 | 13.2 | 78.4 | 9.5 | 101.1 | 13.5% |
| Total | 60 | 39.6 | 235.2 | 9.5 | 284.3 | 9.2% |

- *Measurement Indicator #3* POTENTIAL GRAVEL QUANTITIES NEEDED

It is estimated that between 1,662 (4 inches of gravel surface course) to 3,739 (8 inches of gravel) cubic yards of gravel would be needed for each mile of road construction/reconstruction. It is further assumed that a 5.9-acre well pad would require 6,887 cubic yards of gravel (personal communications, e-mail, Donald Wilcox, US Forest Service, 2 November 2007). In total, estimated maximum gravel needed is 1,476,218 cubic yards (Table 11.5-6). Gravel sources on the Dixie National Forest are limited and it is likely that gravel would have to be imported from off the Forest, likely from adjacent BLM-administered lands or from a private source. If gravel came from existing, permitted pits, impacts would be short term and minor to moderate depending on the amount of source material available. If new gravel pits are required, impacts could be long term if the pit remained active for many years. Impacts associated with new gravel pits on BLM-administered lands would be subject to a project-specific NEPA analysis.

**Table 11.5-6 Estimated amount of gravel needed for road construction/ reconstruction and well pads over a 15-year period by Ranger District.**

| Ranger District | Wells | New Road Construction Exploration Drilling (miles) | Road Recon-struction Exploration Drilling (miles) | New Spur Road Construction Production Field (miles) | Total Road Construction/ Reconstruction (miles) | Maximum Gravel Needed (cubic yards) |
|---|---|---|---|---|---|---|
| Pine Valley | 5 | 3.3 | 19.6 | 9.5 | 32.4 | 155,578.6 |
| Cedar City | 15 | 9.9 | 58.8 | 9.5 | 78.2 | 395,694.8 |
| Powell | 20 | 13.2 | 78.4 | 9.5 | 101.1 | 515,752.9 |
| Escalante | 20 | 13.2 | 78.4 | 9.5 | 101.1 | 515,752.9 |
| Total | 60 | 39.6 | 235.2 | 9.5 | 284.3 | 1,476,218.0 |

### 11.5.4.3 Impacts by Alternative

With the exception of Alternative A, estimated traffic increase (*Measurement Indicator #1*), miles of road construction and reconstruction (*Measurement Indicator #2*), and potential gravel quantities needed (*Measurement Indicator #3*) would be the same under all alternatives. Impacts by alternative are thus the same and as described in Section 11.5.4.2 (Impacts of Connected Actions under SLT).

## 11.5.5 Cumulative Effects

Cumulative effects are the total effect, including direct and indirect effects, on a given resource resulting from the incremental impact of past, present, and reasonably foreseeable future actions. They can result from individually minor, but collectively significant actions taken over a period of time. Cumulative effects may arise from single or multiple actions and the effects may be additive or interactive. The net adverse effect of interactive actions may be less than the sum of the individual effects (countervailing) or the actions may interact to create a net adverse cumulative effect that is greater than the sum of the individual effects (synergistic). The magnitude and extent of the effect on a resource depends on whether the cumulative effects exceed the ability of a resource to function at a desired level (CEQ 1997).

### 11.5.5.1 Description of Cumulative Effects Area

The Cumulative Effects Area (CEA) for transportation (see figure in the Recreation Specialist Report) is all 6$^{th}$ level HUC subwatersheds occurring on the Dixie National Forest that are within the

following boundaries: north of the Virgin River, east of the Union Pacific rail line located west of the Utah-Nevada border, south and east of US Highway 56 and Desert Mount Road, east of Interstate 15 north of Cedar City, and south and west of US Highway 12 on the Fremont River Ranger District. The CEA would also include all of Bryce Canyon National Park and all land between the subwatersheds and a buffer extending 5 miles south from US Highway 12 between the towns of Boulder and Escalante. No data existed for one of the subwatersheds on the west side of the Pine Valley Ranger District and a buffer was created by extending a boundary west from the nearest subwatershed (Nephi Draw HUC 160300061301) along an existing dirt road to an intersection with the Union Pacific rail line at Brown, Nevada.

**RATIONALE**

The CEA covers all major transportation corridors accessing the Dixie National Forest.

### 11.5.5.2 Past, Present, and Reasonably Foreseeable Actions

The lands within the CEA are mostly (79%) administered by federal agencies (49% US Forest Service, 29% BLM, and 1% NPS) and actions on these lands were, are, or will be subject to NEPA. The remaining lands (21%) are either privately owned (16%) or administered by the State of Utah (5%).

**PAST AND PRESENT ACTIONS**

Existing miles of Forest System roads on the Dixie National Forest and annual average daily traffic volume on Utah Highways occurring on the Dixie National Forest are discussed in Section 11.4.4. Miles of existing roads within the CEA and off the Dixie National Forest has not been calculated, but is likely higher than on the Forest. State Route 22 occurs within the CEA, but entirely off the Dixie National Forest.

Past oil and gas activity within the CEA has been relatively low, with the Upper Valley Field being the only producing oil field. The Upper Valley oil field was discovered in 1964 (USFS 1994). The field is located on the southern edge of the Escalante Ranger District and occurs both on the Dixie National Forest as well as on adjacent portions of the Grand Staircase-Escalante National Monument. The field has approximately 28 producing wells (USDA 2006b), with total production to date of over 22 million barrels of oil. As there are no oil or gas pipelines in the region, all of the oil is trucked (3 -5 trips/week) 300 miles to refineries in Salt Lake City (UGS 1997).

In the past few years there has been a renewed interest in oil and gas within the CEA and there are currently 122 authorized leases and 14 pending leases, with a combined total lease area of 101,682 acres (BLM 2008). While these leases occur throughout the CEA, they tend to occur in clusters. Some of the larger clusters are to the south and north of the Cedar City Ranger District, in between the Cedar City and Powell Ranger Districts, and off the southeast corner of the Escalante District (an extension of the Upper Valley Field). Only the Upper Valley Field is currently active. The only other recent activity on these leases has been the drilling of a few (5) wildcat wells on state and private land, all of which have been capped and abandoned (UDNR 2008a). Also, there is the possibility of unquantified drilling for coal bed methane on SITLA land within the John's Valley area within the next 15 years. This would likely involve not only drilling but also establishment of a gas delivery system to market the gas if it occurred in paying quantities. Production would most likely be gas rather than oil. One of the 5 wells that were capped and abandoned was a coal bed methane well in this area.

In addition to oil and gas activity, there are currently 25 separate minerals activities, more than half of which are on BLM land surrounding the Pine Valley Ranger District. These mineral activities are all very small operations (less than 5 acres) and primarily target materials such as sandstone,

limestone, silica, rhyolite, alabaster, and travertine (UDNR 2008b). There are a few larger mines for iron, gold, and silver; however, all of these are inactive or in some stage of reclamation.

**REASONABLE FORESEEABLE FUTURE ACTIONS**

Many reasonable foreseeable future federal actions are known within the CEA (see other Specialist Reports) that would at some unknown level impact (increase) traffic volume on roads within the CEA. The CEA also includes private and State of Utah lands and 28 municipalities within 5 counties. It is reasonably foreseeable that future road construction will continue on these lands and that traffic volume will increase as a result of population growth in at least some of these areas.

The Dixie National Forest is currently preparing an EIS to establish a forest-wide system of designated routes and areas for motorized travel (Motorized Travel Plan). Miles of Forest System roads are not expected to change significantly as result of this EIS. In addition to this, there are four projects on the Dixie National Forest that involve some level of road construction On the Pine Valley Ranger District, the Upper Santa Clara River Vegetation and Fuels Project would involve approximately 3.3 miles of temporary road construction, with 1.2 miles becoming part of the Forest System used to access existing campgrounds after Project completion. On the Cedar City Ranger District, the Bear Valley Rangeland and Prairie-dog Habitat Improvement Project would obliterate 10 acres of roads in 2008. The Cedar City Ranger District is also currently preparing an EA for the Webster Flat Road Reconstruction Project. The project would involve the reconstruction of four miles of arterial gravel road, including some new construction. On the Powell Ranger District, the Mt Dutton Vegetation Management Project would improve approximately 5 miles of unauthorized roads and designate them as NFS roads. Lastly, on the Escalante Ranger District, the planned Pockets Vegetation Management Project would require 9 miles of new roads, 7.0 miles of unauthorized roads would be designated NFS roads, and 13.4 miles of existing NFS roads would be improved. No other new road construction projects are planned on the Dixie National Forest.

The Grand Staircase-Escalante National Monument predicts 3.5 miles of new road construction over the next 15 years (BLM 1999). No planned, new road construction projects within the CEA on lands administered by the National Park Service, Cedar City Field Office, or Richfield Field Office are known.

In June 2006 the Kanab Field Office, BLM received a mine permit application (Coal Hollow Mine) to surface mine about 2,000,000 tons of coal annually at a rate of 8,300 tons per day. The application is currently considered incomplete, but it is reasonable certain that the application will be accepted in the near future and that the project will undergo NEPA analysis. The proposed mine would be located near the town of Alton, Utah within the CEA. The mine would operate 5 days per week (Monday-Friday). Coal would be transported from the mine via 43-ton coal trucks. Trucks would travel from Alton to Highway 89, north to US 20, east to I-15, south on I-15 to Cedar City and from Cedar City west 10 miles to a proposed rail loadout. Approximately 190 truck trips per day would be required to handle the coal production. No other future transportation-related projects are known within the CEA on lands administered by the Kanab Field Office.

Within the CEA, and partially on lands administered by the St. George Field Office, the City of St. George is proposing to widen Skyline Drive from two to four lanes, which will likely increase traffic volume at some unknown level on this road. No other planned road construction on lands administered by the St. George Field Office within the CEA is known.

### 11.5.5.3 Cumulative Effects

Connected actions under the RFDS could result in adverse cumulative effects related to road maintenance costs and public safety if an oil field were developed and resulted in adding additional

truck traffic to those routes currently used to transport oil from the Upper Valley oil field. This impact would be long term and could be moderate. Similarly, adverse cumulative effects could occur if both a production field and the potential Coal Hollow Mine were to transport product on the same routes. This impact would be long term and, given the large number of estimated trips associated with the Coal Hollow Mine, major. No other transportation-related cumulative effects are expected from implementation of the RFDS.

## 11.6 Compliance with Other Laws and Regulations

Road construction would be completed following local, state, county, and federal laws and regulations.

## 11.7 Forest Plan Consistency Determination

Roads would be constructed according to US Forest Service and BLM standards. Road construction is allowed under the LRMP (1996). Impacts of road construction on other resources are described in the other Specialist Reports.

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# Appendix 11A – Estimated Traffic Types and Volumes

## Estimated Traffic Types and Volumes for Activities On the Fishlake National Forest (Draft: 09/17/2007)

| ACTIVITY | LIGHT TRUCKS (Round Trips) | HEAVY TRUCKS (Round Trips) |
|---|---|---|
| **EXPLORATION WELLS (Total Traffic Volumes/Well)** | | |
| **Area Reconnaissance and Surveying – Planning Pads and Wells** | 15 | - |
| **Mobilize Construction Equipment** | 2 | 5 |
| **Road and Pad Construction** | | |
| Equipment Mobilization | - | 8 |
| Personnel/Supplies | 25 | |
| Gravel Hauling | - | 288 |
| **Drill Rig Mobilization** | | |
| Rig Components (Move-in) | - | 30 |
| (Move out) | - | 30 |
| Personnel/Supplies | 25 | - |
| **Exploration Drilling** | | |
| Water Trucks | - | 300 |
| Waste Disposal | - | 50 |
| Drill Mud/Materials | - | 10 – 20 |
| Well Casing | - | 10 |
| Cement/Flyash | - | 4 - 9 |
| Misc. Equipment | - | 10 |
| Personnel/Supplies | 100 | - |
| **Well Plugging and Abandonment/Reclamation of Pad and Road (No Discovery)** | | |
| Cement and Water | - | 15 |
| Construction Equipment | - | 5 |
| Remove/Haul Reserve Pit Fluids for Disposal | - | 10 |
| Personnel/Supplies | 20 | - |
| **DISCOVERY/PRODUCTION WELLS (Total Traffic Volumes/Well)** | | |
| **Well Completion/Completion Rig** | | |
| Rig Mobilization (Move-in) | - | 4 |
| (Move-out) | - | 4 |
| Casing/Perforation/Cementing, Fracturing | - | 30 |
| Water Trucks | - | 50 |
| Personnel/Supplies | 15 | - |

| ACTIVITY | LIGHT TRUCKS (Round Trips) | HEAVY TRUCKS (Round Trips) |
|---|---|---|
| **PRODUCTION WELL PADS (Total Traffic Volumes/Pad)** | | |
| **Production Construction/Development** | | |
| Haul in Facilities (Wellhead/pumps, tanks, pipeline manifolds, etc.) | - | 10 |
| Personnel/Supplies | - | - |
| | 25 | |
| **CENTRAL PRODUCTION FACILITIES/ANCILLARY FACILITIES (Total Traffic Volumes/Field) 2 Fields Predicted** | | |
| **Construction** | | |
| Construction Equipment Mobilization | - | 8-20 |
| Gravel Hauling to Pad | - | 300 |
| Personnel/Supplies | 50 | - |
| **Buildings/Facilities (Compressors, Generators, Pipeline Manifolds, Heater-Treaters, etc.)** | | |
| Hauling to pad | - | 10-100 |
| Personnel/Supplies | 200 | - |
| **Pipeline, Powerlines, Oil Loading Pad** | | |
| Haul in Equipment (excavators, pipe, welders, etc.) | - | 50 |
| Personnel/Supplies | 100 | - |
| **FIELD OPERATIONS/PRODUCTION (Average Traffic Volumes/Day)** | | |
| **Operations** | | |
| Haul oil to market/refinery | - | 10 |
| Dispose of water/distillates/gas | - | 0-1 |
| Workover rigs | 0.1 | 0.1 |
| Maintenance/Repairs | 0.2 | 0-0.1 |
| Personnel/Supplies | 3 | - |
| Other?? | 0.1 | 0-0.1 |
| **FIELD/WELL ABANDONMENT/REMOVAL (Total Traffic Volume/Field)** | | |
| **Plug and Abandon Production Wells** | 20 | |
| Remove downhole pumps, monitors, etc. | | Combined with rig mobilization |
| Mobilize Plugging Rig (Move-in) | - | 40 |
| (Move-out) | | 40 |
| Plug/Cement (Haul cement, plugging mud, water, etc.) | - | 50-100 |
| **Mobilize construction equipment** | - | 8 |
| **Remove buildings, facilities, and contaminated gravel and soils** | - | 25-50 |
| **Personnel/Supplies** | 100 | - |

| ACTIVITY | LIGHT TRUCKS (Round Trips) | HEAVY TRUCKS (Round Trips) |
|---|---|---|
| **RECLAIM SURFACE DISTURBANCE (Total Traffic Volume/Field)** | | |
| **Mobilize construction equipment** | - | 25 |
| **Contour disturbed area (approx. original contour), replace topsoil, and seed/mulch** | - | 15 |
| **Fence reclaimed pads** | - | 3 |
| **Personnel/Supplies** | 30-50 | - |

Based mostly on Utah Department of Transportation US 40 Corridor Predicted Traffic Volumes and personnel communications with Wolverine Gas and Oil Co.
Gravel hauling estimated by Forest Service based on required average aggregate depth requirements, pad sizes, and road distances.

# Appendix 11B - Dixie National Forest Oil and Gas Construction and Operating Standards and Well Site Design Requirements

# Dixie National Forest Oil and Gas Construction and Operating Standards and Well Site Design Requirements

## I. INTRODUCTION

The following operating standards and well site design requirements would be required by the Dixie National Forest for oil and gas facilities and operations to assure consistency with management objectives for the Forest. These operating standards should not be confused with stipulations contained in the applicable Federal oil and gas lease(s) which specify requirements regarding surface occupancy and timing within the specific areas in the lease. Operating standards must be consistent with the rights and restrictions established in the applicable lease(s) and are applicable to all drilling and production operations, unless otherwise approved by the responsible officer based on site-specific conditions.

These operating standards supplement the general requirements of the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Gold Book) and Best Management Practices in place by the responsible agencies at the time of approval, and the Forest Service, Region 4 Oil and Gas Roading Guidelines. Copies will be made available to operators at first notification of proposed operations.

Authority to require such standards is provided by the Mineral Leasing Act of 1920, as amended, Federal Regulations at 36 CFR 228.106-108 (Submission, Review, and Requirements of Surface Use Plans of Operations) and 43 CFR 3162.3 (BLM procedures for approval of post-lease applications for operations).

## II. PURPOSE

These operating standards have been developed to help operators meet agency and Forest requirement when planning operations and preparing their Surface Use Plan of Operations and to assure overall consistency with Forest Service management objectives/direction. They have been developed based on experience with oil and gas operations on National Forest System lands as needed to prevent or mitigate effects and conflicts with other uses.

## III. PROCESS

Approvals of proposed operations on lease are subject to the application, review, and approval provisions specified in Onshore Oil and Gas Order No. 1, other Onshore Oil and Gas Orders, and all applicable laws and regulations. Surface disturbing proposals must be evaluated under the requirements of the National Environmental Policy Act of 1969 and the Energy Policy Act of 2005. Operators are encouraged to obtain these operating standards from the Forest Service early in the planning and approval process and to incorporate them into their Surface Use Plans of Operations to help streamline the NEPA analysis and approval process. If not incorporated into the initial SUPO, the Forest Service will work with the operator to revise the SUPO to include them or may otherwise require them as Conditions of Approval (COA).

Other standards or mitigations may be required based on site-specific evaluations of proposed activities. They may be modified if needed to address site-specific conditions. Operators are required to comply with all other applicable laws and regulations.

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## IV. OPERATING STANDARDS

These standards apply to the lease holder, contractors, and their sub-contractors. The term "operator" as used herein, includes the lease holder and/or company authorized to conduct operations on the lease or their contractors, subcontractors, and all employees or agents thereof.

1. The operator shall submit for review and approval, a detailed construction and maintenance plan for all exploration and production facilities and roads to be constructed or improved (reconstructed) for operations. Unless otherwise approved by the responsible Forest Service officer, pad designs must be consistent with requirements contained in the Dixie National Forest Well Site Requirements (Attachment 1). A road-use permit (or specific approval as part of the Surface Use Plan of Operations) must be obtained from the Forest Service for commercial use, improvement, and maintenance of National Forest System roads under authority of the National Forest Roads and Trails Act. Road designs must be generally consistent with the Forest Service guidelines provided in the Oil and Gas Roading Guidelines, R-4.

2. The designs for roads, pads, and other facilities are subject to approval by the Forest Service. The designs must be approved and signed by a qualified licensed engineer. Any modifications to approved plans are subject to Forest Service review and approval.

3. Existing roads will be used to the extent possible as long as the existing alignment can be used or improved to the required standard. Additional roads or rerouting of existing road segments, if needed, shall be minimized and approved by the Forest Service prior to construction. Roads or road segments replaced and/or abandoned by construction of new roads or rerouting must be reclaimed by the operator. Road locations and designs must be generally consistent with the Forest Service guidelines provided in the Oil and Gas Roading Guidelines, R-4.

4. Locate and design roads and drainage structures to prevent slope failure and minimize impacts on water quality. To the maximum extent feasible, locate facilities, including service and refueling areas, on benches upslope from streams, lakes, ponds, riparian areas, and floodplains.

5. A pre-construction meeting including the responsible company representative(s), contractors, and the Forest Service must be conducted at the project work site prior to commencement of operations. Earthwork must be construction staked prior to this meeting. Approval of the designs and earthwork staking by responsible Forest Service official is required prior to beginning earthwork.

6. A Spill Prevention Control and Countermeasures (SPCC) Plan consistent with the current EPA Region VIII Oil and Hazardous Substances Regional Contingency Plan must be filed with the Forest Service and approved by the authorized officer prior to conducting any construction and operations on National Forest System lands. The plan must address the potential for spills to occur from haulage of materials and supplies to the construction/operations site(s) as well as drilling and production facilities. Material Safety Data Sheets (MSDS) for all potentially hazardous substances used for operations used for operations must be available on-site. Operators must be trained in MSDS protocols.

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7. All surface disturbing activities, including reclamation, must be supervised by a qualified on-site responsible designated company representative(s) familiar with the approved plans as well as terms and conditions of approval. The designated representative(s) must be available for contact within the vicinity of the project area or by telephone at all times that operations are in progress. The name and contact telephone number of the designated company representative(s) must be filed with the responsible Forest Service official. A copy of all approved permits with specifications relative to operations in the project area must be available for inspection at the project site.

8. Topsoil must be salvaged from the area to be disturbed, stored, and protected from erosion and contamination until redistributed over recontoured areas for reclamation. The depth of topsoil to be salvaged must be determined though testing and approved by the Forest Service. Methods of topsoil handling and storage must be approved in project plans and specifications and/or appropriate project permits.

9. All vegetation removed by operations must be stored, used for reclamation, or disposed of as approved in project permits or as specified by the Forest Service. The operator must reimburse the Forest Service for the fair market value of all merchantable timber removed or damaged during operations. Prior to vegetation disturbance/removal all noxious weeds must be removed from the site and handled by approved methods needed to prevent spread of seeds.

10. Where determined appropriate by the responsible Forest Service officer, the operator may be required to bury pipelines and powerlines in or adjacent to roads to reduce surface disturbance and visibility. Designs must provide sufficient depth of cover and signs to indicate the type of pipeline(s), location, and depth to prevent damage from road maintenance and other surface disturbing activities in conformance with applicable Federal and State regulations.

11. Where feasible and appropriate, the operator will be required to centralize production facilities, use telemetry to monitor wells, and delay non-essential maintenance activities in important wildlife habitat during critical seasons of use to reduce the number of vehicle trips to the sites and activity that could disturb or stress wildlife.

12. Where needed to protect wildlife, the operator will be required to construct fences and/or nets on reserve pits or use other approved methods to prevent wildlife use or entrapment.

13. Stream crossings will be planned and constructed to minimize disturbance of the riparian and aquatic habitats by locating crossings at the most advantageous location and by crossing at or near the perpendicular. Structures must be designed to allow fish passage as needed to maintain habitat. Measures must be taken to minimize disruption of stream substrate. When no longer needed for operations, crossings must be removed and the stream and banks restored to pre-disturbance conditions/stream hydraulics. Sediment control measures must be used to minimize sediment introduction during all operations. Timing restrictions (construction and reclamation) may be needed to protect fisheries as coordinated with the Utah Division of Wildlife Resources and through permitting with the Utah Division of Water Rights, Stream

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Alteration Program.

14. Unless otherwise specified by the responsible Forest Service officer, new oil and gas access roads shall be closed to the public. Operators must construct and maintain gates to Forest Service design standards at intersections of project access roads with National Forest System roads or other highways to prevent unauthorized traffic from entering. A locking system will be required to allow a Forest Service lock in addition to the operator's lock.

15. Off-road vehicle travel is prohibited unless specifically approved in project permits.

16. Roads used for drilling and production operations which remain open to public traffic must be properly signed to warn the public of project traffic and associated hazards. Signs must be consistent with the Manual on Uniform Traffic Control Devises, Federal Highway Administration.

17. Vehicle operators must obey posted speed restrictions. If speed restrictions are not posted, the operator and contractors must observe safe speeds commensurate with weather and road conditions.

18. Watering and/or application of appropriate dust suppressants shall be used if dust becomes a concern for visibility and sediment transport. Suppressants and application procedures are subject to approval by the responsible Forest Service officer.

19. Unless otherwise approved by the responsible Forest Service officer, all production pads will be fenced to prevent entry by the public and livestock. Designs and specifications are subject to Forest Service approval.

20. Sediment control structures will be used to catch sediment at the base of fill slopes on exploration and production pads. If silt fences are used, they must be constructed with adequate support and maintained to assure that they function at all times, including the winter season and spring runoff.

21. Establishment of staging areas or camp areas outside of the area permitted for surface disturbing operations for project personnel (operator or contractors) on National Forest System lands is subject to Forest Service approval.

22. All permanent survey markers within the area to be disturbed, including section corners, benchmarks, geodetic survey monuments, etc. must be located and flagged for protection prior to any surface disturbance activities. Disturbance or relocation of monuments requires the approval of the agency responsible for their use and preservation.

23. Water needed for operations must be obtained in accordance with State water law. The location and design of diversions on National Forest System lands are subject to review and approval of the responsible Forest Service official.

24. The operator and all contractors shall take measures needed for the prevention of fires started as a result of their operations and to suppress fires that are started as a result of their operations. Fire suppression equipment must be available to all personnel in the project area consisting of shovels, axes, and other appropriate hand tools. At least

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one properly rated fire extinguisher must be available in each vehicle and around all machinery such that they are readily assessable for suppression of fires. During times of severe fire danger when fire restrictions are implemented by order of the responsible Forest Service officer, all operations must be conducted in conformance with the order. The operator may be required to submit and implement a Fire Prevention/Suppression Plan for review/approval by the responsible Forest Service official.

25. All vehicles and other gasoline/diesel-powered equipment must be equipped with properly functioning spark arresters and mufflers. Spark arresters must meet Forest Service specifications in accordance with USDA Forest Service Spark Arrester Guide.

26. The operator will be held responsible for damage and suppression costs for fires started as a result of operations. Fires must be immediately suppressed to prevent spreading and must be reported to the responsible Forest Service officer.

27. The operator must maintain structures, facilities, improvements, and equipment in a safe and neat manner and in accordance with approved permits. The operator must take appropriate measures in accordance with applicable Federal and State laws and regulations to protect the public from hazardous or conditions resulting from the operations. Such measures must include, but are not limited to, posting signs, building fences, or otherwise identifying the potentially hazardous site or condition.

28. All accidents or mishaps resulting in resource/property damage and/or serious personal injury must be reported to the responsible Forest Service officer as soon as possible.

29. The operator may be required to locate pads and facilities in areas where they can be effectively screened from view from sensitive areas. Production facilities must be located and designed to minimize visibility from sensitive viewing areas. Painting of facilities with a non-reflective paint in the color that would best blend with the background will be required. The color will be determined by the operator with approval of the responsible Forest Service officer.

30. The operator must comply with all applicable laws and regulations pertaining to the storage, use, and disposal of hazardous substances and solid or liquid waste. All fluids, chemicals, and solid wastes must be properly contained on-site. Reserve pits, catchment ponds, and bermed areas must be constructed to prevent seepage into the ground or adjacent areas. A minimum of 2-feet of freeboard must be maintained in all reserve pits and ponds at all times to prevent overflow and spillage into adjacent areas.

31. Chemical containers should not be stored on bare ground or exposed to the sun or moisture. Containers and labels are subject to degradation and punctured drums could leak contents onto the ground. Chemical containers should be maintained in good condition and placed within secondary containment in case of a spill or puncture. Secondary containment facilities must be of sufficient size to contain all appropriate fluids, including diesel or other fuels.

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32. Sanitary facilities must be available to operators and contractors in the project area and properly used and maintained to prevent pollution. The installation of sanitary facilities, other than self-contained chemical toilets is subject to State and Forest Service approval.

33. Unless other methods are specifically approved, all solid wastes, contaminated soil materials, drill cuttings, petroleum products, and other fluids must be properly contained on-site. Disposal of associated waste materials must be at a facility licensed by the State to accept such materials.

34. Harassment of wildlife is prohibited. Pets must be properly restrained to prevent harassment of wildlife, livestock, government officials, and the public.

35. Move-in and move-out of heavy construction and drilling equipment will not be allowed during the opening weekends of the general big-game hunts or holiday weekends (including the observed holiday) from noon the previous day until midnight on Sunday or the observed holiday. Use and maintenance of National Forest System roads is regulated under authority of the National Forest Roads and Trails Act and the National Forest Management Act.

36. Vegetation seeding methods and seed mixes (species and amounts) used for interim and final reclamation must be approved by the Forest Service. Reclamation and revegetation plans and standards for success must be approved in project plans or permits. All vegetation materials, seeds, soil amendments, and sediment control materials must be certified that no noxious weed seed or noxious weeds are present. The operator is responsible for control and eradication of noxious weeds in project area, and the control and eradication of any invasive plant species not present at the site prior to operations, until such time as reclamation standards are met and the company is relieved of further reclamation responsibilities.

37. Vehicles and equipment shall be free of mud, soil, plant materials, and other debris which could contain noxious weed seeds prior to coming onto the Forest. This is needed to avoid transporting noxious weeds, or invasive species to sites on the Forest.

38. The operator shall follow Forest guidelines designed to prevent the introduction and spread of aquatic nuisance species (Dixie and Dixie National Forest Supplement, Forest Handbook 2509.16, chapter 1.

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# Dixie National Forest Well Site Requirements

## V. WELL SITE DESIGN REQUIREMENTS

### A. General Requirements

The operator should propose locating the well site in cooperation with Forest Service personnel on the most nearly level location obtainable that would accommodate the intended use. However, potential well site locations should not be evaluated on the basis of site conditions alone. Access to the well site for road and possible future pipeline locations must also be considered in determining the most suitable location. What may be gained on a good location could be lost from an adverse access route. Plan the well site from the long-term standpoint, assuming a discovery could be made. Future pipeline locations are to be proposed by the operator as a part of his proposal on each well site.

Adjust the well site layout to conform to the best topographic situation. Avoid disturbance of drainages and locate reserve pits away from water courses. Deep vertical cuts and long fill slopes should be avoided. The cut and fill volumes should be balanced, excluding the topsoil and subsoil needed to backfill the reserve pit.

A contour map shall be developed for all well pad locations as an aid in the design of pad settings to the existing topography. This will allow the operator to plan the construction of facilities and the surface manager to evaluate impacts and calculate the bond more expeditiously and accurately. Maps should be prepared to a scale of 1 inch equals 20 feet horizontally and a contour interval of 2 feet vertically, or as otherwise directed by the responsible Forest Service officer.

Once this information is compiled, finished site elevations, cut and fill slopes and their respective catch points, drainage, balanced earth work, adequate storage area locations and other necessary construction features shall be determined and included with the drawings/specifications. Submittals shall include a well site plan (see Drawing No. 1), details of berms, diversion ditches, pits, catchments and other appurtenances and design features. Provide data to support drainage structure design.

### B. Clearing

The site must first be cleared of all brush and trees. All merchantable timber must be purchased by the operator prior to cutting, at the appraised price determined by the Forest Service. Grasses and small shrubs need not be removed; however appropriate measure will be required to prevent the spread of noxious weeds and nuisance species prior to starting excavations if they occur on the site. Trees and brush will be disposed of by removal from the Forest, by burning, chipping, or other approved methods needed to prevent the spread of insects. Tree trunks less than 8 inches in diameter and slash can be stockpiled at an approved location to be spread over reclaimed areas. Burning permits will be required and are issued by the Forest Service. Burning would only be permitted if the fire danger is low to moderate.

### C. Topsoil Removal and Storage

Surface soil material (topsoil), if present, will be stripped from all areas where surface

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disturbance is necessary and stockpiled. All topsoil will be removed in a separate layer, avoiding mixing with other excavated materials, and stored in a stockpile to prevent loss from erosion or contamination, and from which topsoil may be easily recovered. The depth of surface soil material to be removed and stockpiled will be specified by the Forest Service but will generally include the A Horizon. The topsoil and subsoil stock piles must be located to prevent contamination from the blooie line, flare line, and other operations. Stockpiles shall be contained by silt fencing, ditches and traps or other containment measures to prevent erosion, contamination and loss. If topsoil stockpiles are to remain for more than a single season, seeding with an approved seed mix will be required to minimize loss from erosion and preserve fertility and biological activity.

**D. Site Grading**

Cut and fill slopes will be such that stability can be maintained for the life of operations. Cut and fill slopes will be constructed as follows (exceptions can be made depending on the type and competency of material encountered):

| Height of Slope | Slope |
|---|---|
| 0 – 5 feet | 3:1 |
| 6 – 10 feet | 2:1 |
| over 10 feet | 1.5:1 |

All fills will be free of vegetation and will be compacted in lifts no greater than 12 inches in thickness to a minimum of 90 percent Proctor dry density sufficient to prevent excessive settlement.

The drill site or pad surface will be surfaced with crushed gravel to a depth sufficient to support anticipated loads throughout the life of the well. Usually a depth of 12 inches of gravel is required.

**E. Site Drainage**

Diversion ditches having the minimum dimensions of 3 feet horizontal to 1 foot vertical (3:1 ditch) will be constructed around the site to divert existing drainages and surface runoff from flowing onto the site. Hydraulic design for ditches is required to determine capacity. The ditch(s) will be located at the top or base of the cut slope (to be determined based on site-specific conditions) and around the toe of the fill slopes (see Drawing No. 1 – Construction Requirements for Typical Well Sites). Straw dykes, catch basins, energy dissipaters or other approved structures will be constructed in the ditch outflow to trap any sediment and dissipate erosive flows. Provide data to support drainage structure designs. A culvert might be necessary where the access road enters the site.

A berm will be constructed around the perimeter of the site to contain all precipitation, spills, and other fluids from leaving the site. The berm will be a minimum of 18 inches high, 12 inches wide at the top, and have 1.5:1 side slopes. Berms will be compacted for stability and to reduce permeability as needed to contain fluids. The site surface will be graded at a minimum of 1 percent to drain to the reserve pit. Use silt fencing, ditches and traps or other containment at toe of fill slopes to prevent erosion and contamination.

The drainage pattern to be constructed will need to be designed for each site, depending on

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site-specific conditions.

**F. Construction and Maintenance of Reserve Pits**

Reserve pits will be constructed of sufficient size and capacity for the necessary fluids for drilling and to contain any runoff from the drill site. The pad will be graded to empty into the reserve pit or alternative pit or buried tank. Winter operations may require larger pits/tanks due to snow accumulations and runoff. Pits will not be constructed within intermittent or perennial drainage channels. If the operator has concerns that drainage from the pad could contaminate reserve pit muds, the pad can be constructed to drain into alternative lined pits or buried containment tanks.

It is preferred that pits be constructed in undisturbed materials and below the natural ground level to minimize the risk of failure. Where conditions exist that require pits to be constructed of embankment materials, the following criteria are required:

1. The area on which the embankment is to be placed will be cleared of all materials including vegetation, topsoil, and unconsolidated soils and gravels.

2. A foundation keyway will be designed and constructed into native materials to dimensions based on site-specific conditions to provide adequate anchoring and sealing of the embankment.

3. The embankment will be constructed using impermeable materials on slopes of 3:1 into the pit and 2:1 outside the pit. The embankment will have a minimum of 10-foot top width. The materials will be compacted to 95 percent Proctor density.

The following are requirements for construction and maintenance of all reserve pits:

4. Pits must be constructed to contain fluids without leaks throughout the life of operations. If pit liners other than clay coatings are used they must be constructed of sufficiently durable and watertight materials to prevent leakage. Compacted bedding material consisting of sand, clay, or other grout may be required to prevent rocks from puncturing the liner and to seal cracks.

5. A minimum of 2-foot freeboard will be maintained in the pit at all times during the drilling operations or if the pit is left unreclaimed over the winter.

6. If wildlife concerns exist, netting or some other approved method will be used to prevent wildlife use of the pit.

**G. Site Reclamation for Nonproductive Wells**

Reclamation of the entire site will be required and will commence immediately after drilling, testing, and well plugging/abandonment are complete. The site will be restored to as nearly as practical to its original condition (approximate original contour). Cut and fill slopes will be reduced and graded to conform to the adjacent terrain.

Reserve pits must be allowed to dry before they are backfilled. Fluids that will not dry must be removed from the Forest. All polluting substances or contaminated materials, such as oil,

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oil-saturated soils and gravels will be removed and disposed of at a State licensed facility licensed to receive these materials. Exceptions to allow for reserve pit solidification may be made if the operator can demonstrate to the responsible Forest Service officer that this method would be effective based on site-specific conditions.

Drainages will be reestablished and temporary measures will be required to prevent erosion on the site until all reclamation and revegetation standards established for the site are met.

In general, the well identification standpipe will be set such that it can be buried by at least two feet of soil. A final determination will be made on a case-by-case basis.

After final grading and before replacement of topsoil, the entire surface of the site shall be scarified to eliminate slippage surfaces and promote root penetration. Topsoil will be spread over the site to achieve approximate uniform stable thickness consistent with the established contours.

The site will be seeded and/or planted with a seed mix as approved in the SUPO or as otherwise approved by the responsible Forest Service officer. Nutrients and soil amendments will be applied to the disturbed surface soil needed to meet the revegetation standards.

A temporary fence will be constructed around the site until reclamation standards have been met. The fence design is subject to Forest Service approval will be designed to prevent entry by livestock or wildlife as needed for the specific area. The fence must be maintained such that it is functional at all times as intended to prevent livestock use and unauthorized access by the public. The operator is responsible for damages to the reclaimed condition of the site due to unauthorized access until final reclamation standards are met and the fence is removed. The operator will be responsible for eradicating noxious weeds and nuisance species each season until the final revegetation standards have been met. Once all reclamation standards have been met, the operator is responsible for removal of the fence, gate, and associated structures and materials.

## H. Site Reclamation for Producing Wells

Interim and final reclamation for producing wells will be accomplished for portions of the site not required for the continued operation of the associated facilities. All disturbed surfaces will be treated to prevent erosion and to compliment the esthetics of the area. A new site plan will be required encompassing the facilities required for operation and interim reclamation measures. Generally, the following measures will be required:

1. The reserve pit will be reclaimed as previously discussed.
2. All polluting substances and contaminated materials, including contaminated soil and gravels will be disposed of as previously discussed.
3. All cut and fill slopes and other disturbed areas not needed for production operations will be contoured to match the surrounding area, topsoiled, and revegetated as previously discussed.
4. The berm will be reestablished on the production pad where removed to accomplish the reclamation discussed in the previous item.

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5. The pad perimeter and reclaimed area will be fenced. Once reclamation standards have been met for the reclaimed portion of the original pad the fence will be relocated onto the perimeter of the production pad.
6. Measures such as painting facilities an appropriate color, and other practical measures will be used to decrease visibility of the site as viewed from sensitive areas such as roads, highways, and recreation areas. Noise suppression devices and submersible pumps (if feasible) may be required as needed to meet scenic, wildlife, and recreation objectives for the area.

**I. Site Maintenance**

The site will require periodic maintenance to ensure that drainages remain functional and that surfaces are properly treated to reduce erosion, contamination, fugitive dust, invasion by undesirable plant species, and impacts to the adjacent areas.

All garbage, debris, and foreign materials shall be contained on site in a cage or other enclosure then will be removed to an established/licensed landfill or other recognized facility.

**J. Site Reclamation for Production Wells**

When production pads and production facilities are no longer needed, the facilities must be removed and final reclamation measures completed as previously prescribed for nonproductive wells. Abandoned or unneeded facilities will be removed/reclaimed within two years. In place abandonment of any facilities such as powerlines, pipelines, etc. will require approval of the Forest Service. If approved, appropriate measures to stabilize and decontaminate them will be required.

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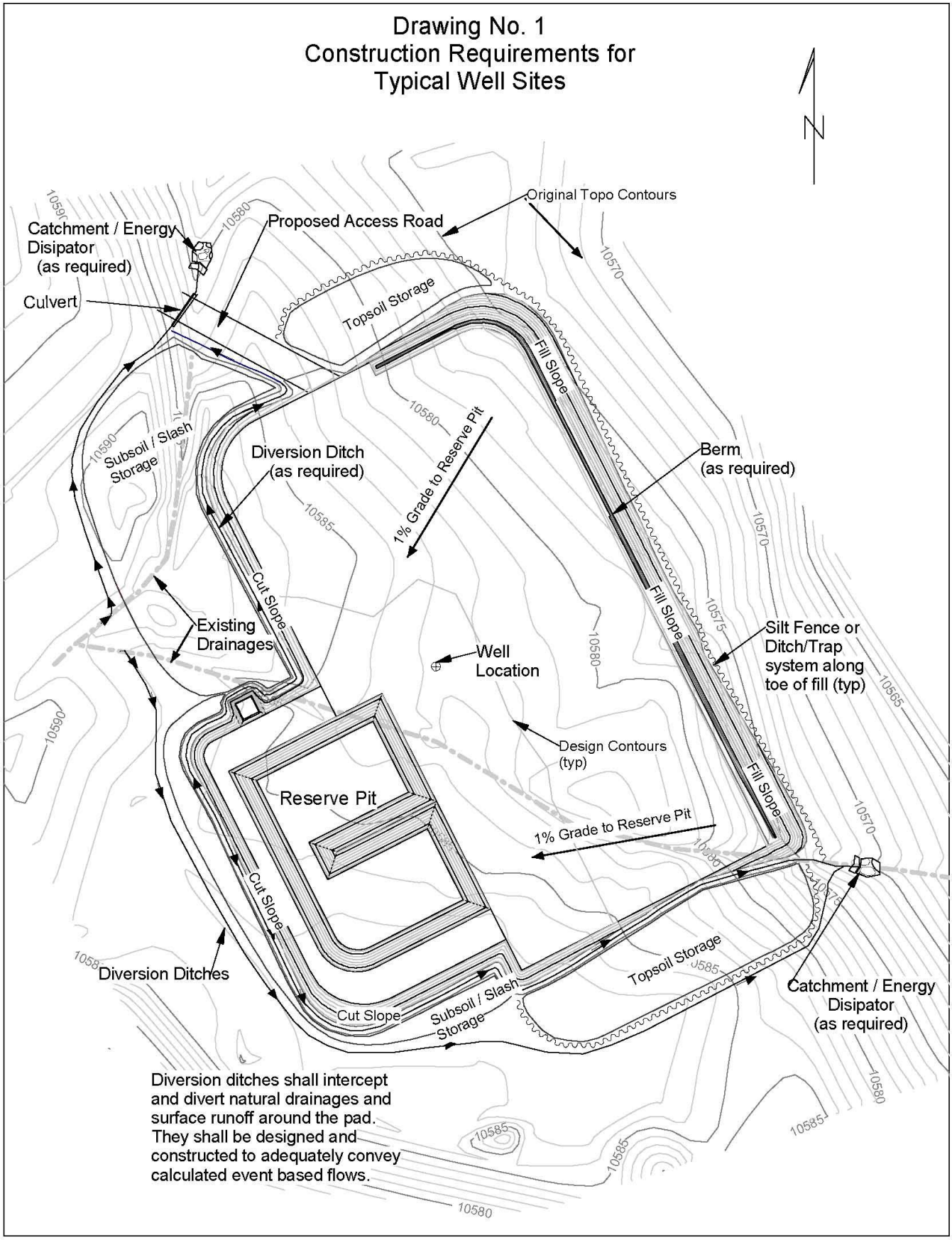
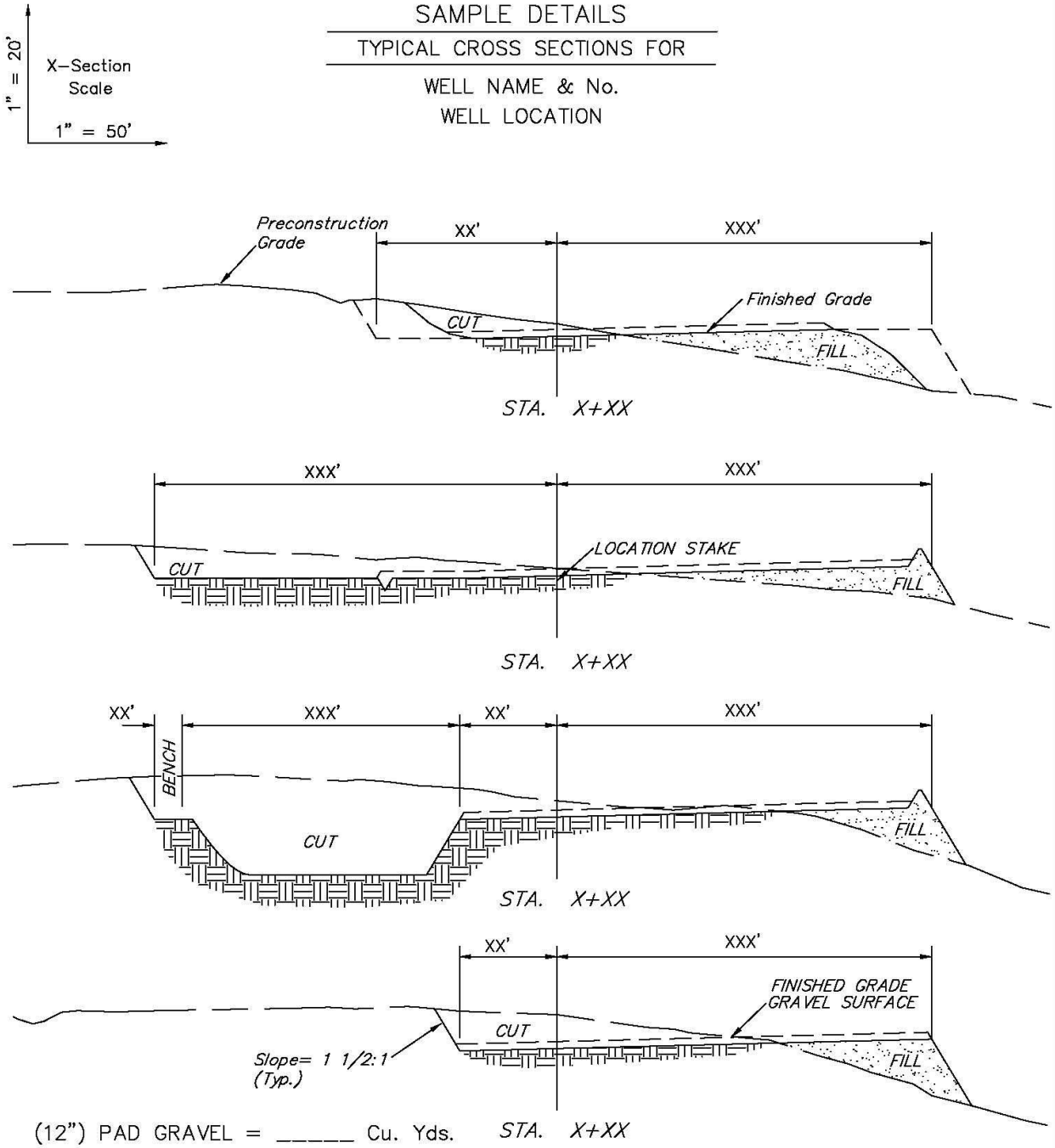

Drawing No. 1
Construction Requirements for
Typical Well Sites
N
Original Topo Contours
Proposed Access Road
Catchment / Energy
Disipator
(as required)
Culvert
Topsoil Storage
Fill Slope
Subsoil / Slash
Storage
Diversion Ditch
(as required)
1% Grade to Reserve Pit
Berm
(as required)
Cut Slope
Existing
Drainages
Well
Location
Silt Fence or
Ditch/Trap
system along
toe of fill (typ)
Design Contours
(typ)
Reserve Pit
1% Grade to Reserve Pit
Diversion Ditches
Cut Slope
Subsoil / Slash
Storage
Topsoil Storage
Catchment / Energy
Disipator
(as required)
Diversion ditches shall intercept
and divert natural drainages and
surface runoff around the pad.
They shall be designed and
constructed to adequately convey
calculated event based flows.
10590
10580
10570
10585
10575
10565

# SAMPLE DETAILS

## TYPICAL CROSS SECTIONS FOR

WELL NAME & No.
WELL LOCATION




(12") PAD GRAVEL = _____ Cu. Yds.

NOTE:
FILL QUANTITY INCLUDES
__% FOR COMPACTION

APPROXIMATE YARDAGES

CUT

Topsoil Stripping (based on xx") = _____ Cu. Yds.

Remaining (excavation) = _____ Cu. Yds.

TOTAL CUT = _____ CU.YDS.

FILL = _____ CU.YDS.

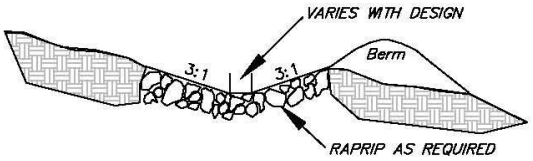
TOPSOIL STORAGE REQUIRED = _____ Cu. Yds.

SUBSOIL STORAGE REQUIRED = _____ Cu. Yds.

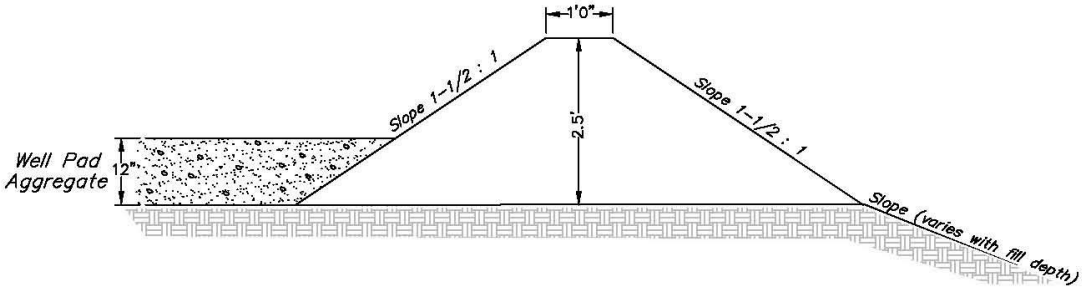
# SAMPLE DETAILS

## DETAIL SHEET

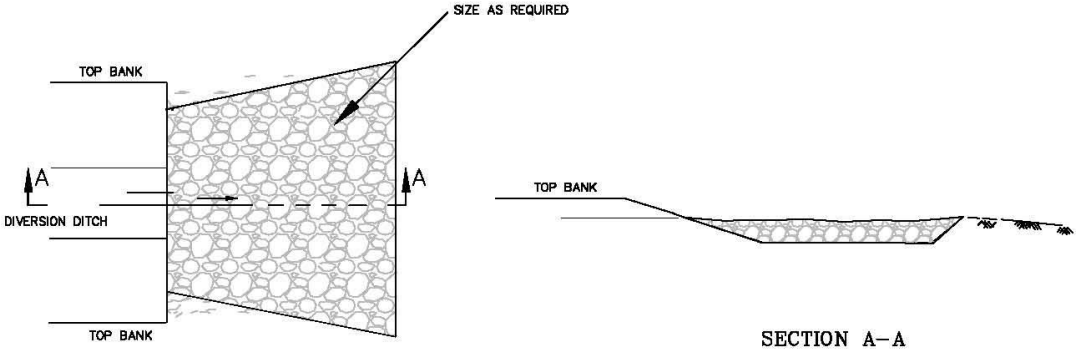
WELL NAME & No.
WELL LOCATION




**DIVERSION DITCH (DETAIL)**
(Only Where Specified)




**BERM (EDGE OF LOCATION)**
(NO SCALE)




**PLAN VIEW**

**SECTION A–A**

**ENERGY DISSIPATER (DETAIL)**