

Incorporating Sustainable Development into the Resource Management Plan Process

Report to:

**Bureau of Land Management
Nevada State Office
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Report by:

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Executive Summary

This research was sponsored by the BLM under the Great Basin Cooperative Ecosystems Studies Unit (CESU) that is in place with the University of Nevada, Reno and other institutions in the Great Basin. The report provides a summary of sustainable development concepts and how they relate to healthy communities. It describes the role of sustainable development in the RMP and provides specific references to statutes and BLM policy dealing with sustainable development. The selection and use of indicators to track the progress towards sustainable development are described. The report also provides recommendations of how sustainable development can be included in future RMPs.

Sustainable development concepts are unique because they can be implemented at any scale for different industries, countries, or any other level of organization. The goal of sustainable development is to work toward complete sustainability. Because future demands on resources and development of technology can not be known, complete sustainability is not achievable, or even desirable. What is desirable is that we assess our current situation and work toward a common goal of sustainability, and allow future generations to define for themselves what it means to live sustainably.

Sustainable development as a term and concept is relatively new; it developed from an initial mention of the term in 1972 to the definition by the Brundtland commission in 1987: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Subsequent to this the United Nations sponsored the Conference on Environment and Development (Rio de Janeiro, 1992) and the World Summit on Sustainable Development (Johannesburg, 2002) and progress has been made on many industry fronts, such as the Mining, Metals and Sustainable Development Project. Individual mining companies also champion the concepts and their application and so does many regulatory agencies, including the BLM.

Sustainable development depends on the interrelationships between economic, social, and environmental factors to allow preserving what is available today while anticipating the future. A focus on any one of the three could be used to plan for improved living conditions, but sustainable development brings the three factors together and brings about a whole new set of ideas concerning how one decision will affect the others, each being equally important to the longevity of a community and the quality of life. Sustainable development thinking and active implementation require a much broader set of considerations in the development, operation and closure of mines.

The cycle of short-term economic prosperity and decline, casually called the boom/bust cycle, is well-known in the American West. Losses to the economic foundation make it difficult to maintain the existing infrastructure, and the community begins to decline. One of the ways a community can choose to continue to meet the needs of today, while also planning for the inevitabilities of tomorrow, is through application of the tenets of sustainable development.

Sustainability and Sustainable Development are concepts that have been an integral part of the BLM for many years. For example, one of the long-term goals of the Nevada BLM is to create opportunities for Nevada's communities through the use of public lands and their resources. This goal is to be balanced against the Nevada BLM vision to preserve the character of the landscape, preserve cultural and social values, and protect ecosystems, all while maintaining access to the important resources found on public lands. This vision is similar in purpose to the goals of sustainable development, and illustrates how, in several ways, many of the tenets of sustainable development have already been implemented into BLM land management. There are multiple guidance and policy documents that encourage the application of sustainable development to BLM activities.

Sustainable development was made a formal part of BLM Policy with the issuance of a statement by Director Kathleen Clarke on April 21, 2006. In this document, the BLM endorsed the *Sustainable Development Plan of Implementation* as defined at the World Summit on Sustainable Development in Johannesburg in 2002. This endorsement applies to mineral resources on public lands managed by the BLM.

When an individual or mining company proposes to develop a mine on public land, they must file a plan of operations with the BLM, detailing plans for the pre-operational planning and construction of the mine, the operational life of the mine, and the post-operational land rehabilitation. Each of these phases must conform to law, and also conform to the land use plan for that BLM District (Subpart 3809.420(a)(3)). While post-mine uses are permissible under law, it is in the Resource Management Plan that the obstacles to sustainable development can occur. It is here that local input can encourage implementation of approaches to sustainable development.

A BLM land use plan is an important document. It ensures that lands are managed in accordance with law, that goals for the resource are set, and ways these goals are to be met are agreed upon. Within the process of planning lies the room necessary to implement sustainable development. It is here that the stakeholders can evaluate the management alternatives and determine which are in the local interest to work toward sustainable development.

The Resource Management Plan reflects the determination and input from the local communities and their wishes in managing public lands. If a community wishes to move toward sustainable development, implementing it into the local field office resource management plan takes advantage of the wide array of allowable activities that can be placed in the plan.

To date mines have been permitted on a single-use basis. One of the shortcomings of this single-use permitting is the loss of possible future use of the land. When a mine enters its closure phase, it has invested in the infrastructure necessary to operate the mine. Permanent buildings, roads, and power lines were constructed to service the mine over its expected life, and often beyond. Under single use permitting, all of these features must be returned to their original state, despite possibilities of other uses for this infrastructure

that could continue to contribute income to the local community well beyond the mines closure. If permitted in a resource management plan, there are several tools that can be used to change land use status, and make the continued use of disturbed mined lands possible. The first is through authorizations, such as rights-of-way (43 CFR 2800), and leases, permits, and easements (43 CFR 2920). These tools would make possible the continued existence of power lines and roads necessary to support a continued use of the formerly mined land.

To monitor the progress of an implemented course of action toward sustainable development, it is necessary to develop a set of indicators. Sustainable development indicators can give an idea of whether or not a set of actions are leading to the desired outcome. Sustainable development is not something that can be measured directly. It is a concept that is applied to other systems, and therefore measured through its impact on those systems. In a Resource Management Plan, sustainable development can be measured through the contribution made by the RMP to the economic, social, and environmental benefits to the region. Through the selection of appropriate indicators, the benefits of sustainable development can be quantified, and progress toward sustainability measured.

Indicators are listed for the following generic management decisions with respect to operational and post-mining land use:

- Other activities at existing mine sites, e.g. wind energy;
- Land tenure: disposal of land. The operator purchases the land that contain all the facilities and post a financial assurance with the State (as the land is now private);
- Right-of-way authorization. This allows the BLM to issue a permit for the re-use of the existing facilities on public lands;
- Collaboration. Participate with a community sustainable development working group for input on re-use proposals or disposal

The following recommendations are made about the processes and approaches for including sustainable development in RMP's:

- Make sure that the RMP team understands sustainable development concepts.
- Include sustainable development concepts in public presentations related to the scoping study.
- The RMP should incorporate the requirement for ongoing engagement in all phases of the plan implementation and review.
- Include sustainable development concepts in as many resources as possible.
- Develop alternatives under each resource that includes sustainable development in concept and practice.
- Include viable options for changes in land status of disturbed mined land to allow productive post-mining land use.
- Develop a set of indicators for each of the resource areas that can be used to measure the progress towards sustainable development.

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1. Introduction

In the Fall of 2005, the Bureau of Land Management (BLM) began a project to incorporate the tenets of sustainable development into the minerals, lands and realty and socio-economic sections of the Winnemucca Field Office Resource Management Plan. The Resource Management Plan, or RMP, is the planning document that determines which activities are permissible on the lands managed by a BLM field office, and guides the activities that will help achieve the missions and goals of the Department of the Interior (BLM Land Use Planning Handbook, 2005, 1). By implementing sustainable development in the regional RMP, the concepts and future considerations inherent to sustainable development are implemented for the expected life of the planning document.

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The sustainable development project targeted what would seem an unlikely section of the Resource Management Plan (RMP), Minerals Management. While it is recognized that the mining of specific ore bodies cannot be considered sustainable, efforts were made to consider the contributions made to the Winnemucca District by mining, and how those contributions could extend beyond the period of active mining. Given the boom-bust nature of the mining economy in rural Nevada, applying sustainable development seeks to make mining's contribution more sustainable over time.

This report provides a summary of sustainable development concepts and how they relate to healthy communities. It describes the role of sustainable development in the RMP and provides specific references to statutes and BLM policy dealing with sustainable development. The selection and use of indicators to track the progress towards sustainable development are described. The report also provides recommendations of how sustainable development can be included in future RMPs.

2. The Case for Sustainable Development

In this era of limited resources, competing land uses, and growing environmental concerns, a way was sought to allow human progress without endangering the basic systems upon which people depend. The way forward had to do more than minimize human impacts on the Earth, it had to allow for growth and appreciate that only when people have viable livelihoods are environmental protections possible (Gibson, et al, 2005, 47). Through an evolution during the last half of the 20th century, the United States journeyed from full faith in technology to the recognition that dangerous unintended consequences could arise from our incomplete knowledge. The way forward, which would allow humankind to improve or maintain its standard of living while protecting the natural systems upon which we depend, is sustainable development (Gibson, et al, 2005, 48).

Sustainable development concepts are unique because they can be implemented at any scale for different industries, countries, or any other level of organization. The goal of sustainable development is to work toward complete sustainability. Because future demands on resources and development of technology can not be known, complete sustainability is not achievable, or even desirable. What is desirable is that we assess our current situation and work toward a common goal of sustainability, and allow future generations to define for themselves what it means to live sustainably. By always working toward this elusive goal, people can make their communities more sustainable.

2.1. What is Sustainable Development?

Sustainable Development and Sustainability are often used interchangeably; however Porritt (2005) indicates that these concepts are very different. Porritt (2005) defines the differences as follows:

Sustainability may best be defined as the *capacity for continuance into the long-term future*. Anything that can go on being done on an indefinite basis is sustainable. Anything that cannot go on being done indefinitely is unsustainable¹. In that respect, sustainability is the end goal, or desired destination, for the human species as much as for other species.

By contrast, sustainable development is the process by which we move towards sustainability. There have been many attempts to define sustainable development; the most widely used is the definition that first appeared in the Brundtland Report in 1987: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987). But the limitations of this definition are becoming more and more obvious. Above all, it fails to convey the idea that there are biophysical limits within which society must operate if the natural capital upon which we depend is not eroded. The alternative

¹ This is clearly a very pure view of sustainability as 'indefinite' time is poorly grasped by the human mind.

adopted by Forum for the Future – ‘Sustainable development is a dynamic process which enables all people to realize their potential and to improve their quality of life in ways which simultaneously protect and enhance the Earth’s life-support system’ – both affirms sustainable development as a dynamic process and emphasizes the importance of social justice and equity in that it has to be made to work for *all* people. It also makes it clear that achieving sustainable development is not simply about managing the environment more effectively, while people pursue their business as usual. It is a social and economic project as much as an environmental project, with the very positive objective of optimizing human wellbeing.

Sustainable development as a term and concept is relatively new. A historic perspective on sustainable development, taken from Gibson, et al (2005) is provided in Appendix A. A brief summary follows.

In a book linked to the 1972 Stockholm Conference on the Human Environment a suggestion was made that ‘sustainable development’ is the way forward. The concept of sustainable development appeared again eight years later in 1980 in the subtitle of a joint report by the International Union for the Conservation of Nature and Natural Resources, the World Wildlife Fund and the United Nations Environment Programme. It was only another seven years later in 1987 that the Brundtland Commission report (WCED, 1987) provided a definition for sustainable development. This definition is still widely used as a starting point for discussions about sustainable development.

In 1992 the United Nations held its first Conference on Environment and Development in Rio de Janeiro which resulted in Agenda 21, an extensive document compiling officially recognized needs for action on the implementation of sustainable development. This was followed by extensive research and industry specific studies in preparation for the World Summit on Sustainable Development (WSSD) that was held in Johannesburg in 2002.

As part of the many studies in preparation for the WSSD, the mining industry and many other stakeholders sponsored the Mining, Minerals and Sustainable Development project (MMSD, 2002a) that produced a large number of review and development documents. One such product was the Seven Questions to Sustainability approach (MMSD, 2002b) developed by the North American Regional Process of MMSD. A summary of the Seven Questions is presented in Table 1. It is a very powerful methodology that can be used for review of mining (and other) projects on an ongoing basis to judge their contributions to sustainable development.

It is essential that the latter statement be adopted as the expression for sustainable development considerations in mining, i.e. ‘the contributions that mining (or a mining project) makes to sustainable development’. In terms of other resources, such as forests, water and rangeland, one can refer to sustainable forests, sustainable water resources and sustainable rangeland. However, referring to sustainable mining is clearly a misnomer because the mineral resource is not infinite and therefore indefinitely sustainable; the

Table 1
Summary of Seven Questions to Sustainability (after MMSD, 2002b)

<i>Question</i>	<i>Sub-elements</i>
<p>1. <i>Engagement.</i> Are processes of engagement committed to, designed, and implemented that:</p> <ul style="list-style-type: none"> • ensure all affected communities of interest (including vulnerable or disadvantaged sub-populations by reason of, for example, minority status, gender, ethnicity, or poverty) have the opportunity to participate in the decisions that influence their own future; and • are understood, agreed upon by implicated communities of interest and consistent with the legal, institutional, and cultural characteristics of the community and country where the project is located? 	<p>1.1 Engagement processes 1.2 Dispute Resolution Mechanism 1.3 Reporting and Verification 1.4 Adequate Resources 1.5 Informed and Voluntary Consent</p>
<p>2. <i>People:</i> Will the project/operation lead directly or indirectly to maintenance of people's well being (preferably an improvement):</p> <ul style="list-style-type: none"> • during the life of the project or operation? • In post-closure? 	<p>2.1 Community Organizational Capacity 2.2 Social/Cultural Integrity 2.3 Worker and Population Health 2.4 Availability of Basic Infrastructure 2.5 Direct, Indirect and Induced Effects 2.6 Full Social/Cultural Costs, Benefits, Risks 2.7 Responsibilities and Sureties 2.8 Distribution of Costs, Benefits, and Risks 2.9 Social/Cultural Stress and Restoration</p>
<p>3. <i>Environment:</i> Will the project/operation lead directly or indirectly, to the maintenance or strengthening of the integrity of biophysical systems so that they can continue in post closure to provide the needed support for the well-being of people and other life forms?</p>	<p>3.1 Ecosystem Function, Resilience, and Self-organizing capacity 3.2 Ecological Entitlement 3.3 Full Ecosystem Costs, Benefits, Risks 3.4 Responsibilities and Sureties 3.5 Environmental Stress and Action to Ensure Ecosystem Integrity</p>

<p>4. <i>Economy:</i> Is the financial health of the project/operation assured and will the project or operation contribute (through planning, evaluation, decision-making and action) to the long-term viability of the local and regional economy in ways that will help ensure sufficiency for all and provide specific opportunities for the less advantaged?</p>	<p>4.1 Project or Operation Economics 4.2 Operational Efficiencies 4.3 Economic Contributions 4.4 Community/Regional Economies 4.5 Government and Broader Society Economies</p>
<p>5. <i>Traditional and Non-market Activities.</i> Will the project/operation contribute to the long-term viability of traditional and non-market activities in the implicated community and region?</p>	<p>5.1 Activity/Use levels 5.2 Traditional/Cultural Attributes</p>
<p>6. <i>Institutional Arrangements and Governance:</i> Are the institutional arrangements and systems of governance in place to provide a reasonable degree of confidence that the capacity to address project or operation consequences will continue to exist through the full life-cycle including post closure?</p>	<p>6.1 Efficiency and Effectiveness in the Mix of Legislated Rules, Voluntary Programs, Market Incentives, and Unspoken Cultural Norms 6.2 Capacity to Address Operational Consequences 6.3 Bridging to Post Closure Conditions 6.4 Overall Confidence that Commitments Made Will be Fulfilled</p>
<p>7. <i>Synthesis and Continuous Learning:</i> Has an overall evaluation been made and is a system in place for periodic evaluation based on:</p> <ul style="list-style-type: none"> • Consideration of all reasonable alternative configurations and designs at the project level (including the no-go option in the initial evaluation) • Consideration of all reasonable alternatives at the overarching strategic level for supplying the commodity and the services it provides for meeting society’s needs • A synthesis of all the factors raised in this list of questions, leading to an overall judgement that the contribution to people and ecosystems will be net positive over the long term? 	<p>7.1 Project Level Alternatives 7.2 Strategic Level Alternatives 7.3 Overall Synthesis 7.4 Continuous Learning and Improvement</p>

focus has to be on the contributions of mining to sustainable development or sustainability.

Gibson, et al (2005) provides a very useful review of the essentials of sustainability. The details are presented in Appendix A while a summary is provided in Table 2.

Table 2
Essentials of the Concept of Sustainability (from Gibson, et al, 2005)

<p>The concept of sustainability is:</p> <ul style="list-style-type: none">• a challenge to conventional thinking and practice• about long as well as short term wellbeing• comprehensive, covering all the core issues of decision making• a recognition of links and interdependencies, especially between humans and the biophysical foundations for life• embedded in a world of complexity and surprise, in which precautionary approaches are necessary• a recognition of both inviolable limits and endless opportunities for creative innovation• about an open-ended process, not a state• about intertwined means and ends – culture and governance as well as ecology, society and economy• both universal and context dependent

2.2. How Sustainable Development Contributes to Healthy Communities

The cycle of short-term economic prosperity and decline, casually called the boom/bust cycle, is well-known in the American West. A valuable natural resource is found, and proves to be a worthwhile investment. The extraction and processing of this resource requires a significant source of labor, and high wages attract a number of people and their families to the area, either creating a temporary population center or rapidly expanding the population and economy of an existing town. Around this core of workers develops a community, consisting of the workers, their families, and those looking to earn money by providing services to the new population. Eventually, because of local or market forces, the mine closes (Weaver, 1939, 82). The community, which expanded rapidly to accommodate the needs during the boom cycle, now has a smaller income base from which to support the now larger infrastructure. Residents who would otherwise choose to stay leave the area to seek higher wages elsewhere. The growth of the community proved unsustainable, and difficult times are ahead for those who choose to stay behind.

While many communities want to experience growth and offer more to their residents, none want to face the serious problems of decline and the resulting population loss. Losses to the economic foundation make it difficult to maintain the existing infrastructure, and the community begins to decline (Jakle and Wilson, 1992, 210). One of the ways a community can choose to continue to meet the needs of today, while also

planning for the inevitabilities of tomorrow, is through application of the tenets of sustainable development.

In order to create a sustainable community, there are supporting processes which must be understood and taken into account. One common method of describing the interdependencies upon which sustainable development relies is the three pillar version, which emphasizes the role of the economic, social, and environmental dynamic (Gibson, et al, 2005, 55). Like a three-legged stool or other visualization of sustainable development, all three components are needed to support the concept of sustainable development, see Figure 1. Individually, any one of these three can be improved and have a positive impact on the community, but to work toward sustainable development, all three have to be taken into account and appreciated for their role in maintaining the health of the community. Their interdependence works in several ways to support the primary foundations of sustainability.

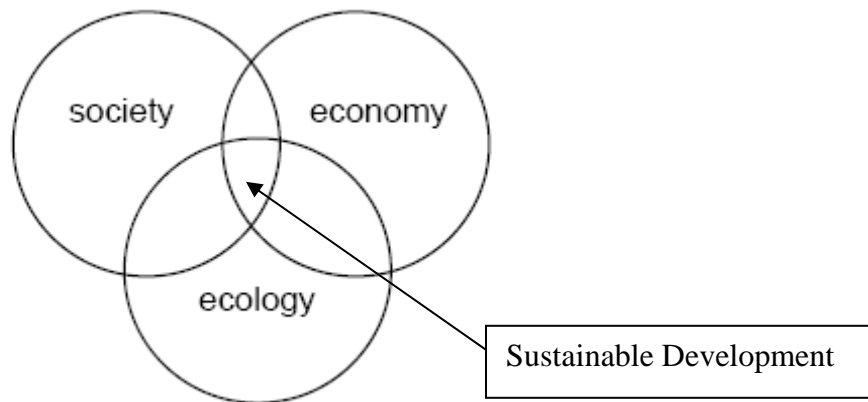


Figure 1 – Intersecting Components of Sustainable Development (after Gibson, et al, 2005)

The **economic foundation** is probably the best known of the three pillars of sustainable development. It consists of the human and natural resources in and near the community that provides the income necessary for trade. In our economic system, a community must be able to produce goods or services that are demanded by others, or face economic obsolescence. In times of transition, when changing economic conditions must be adjusted to, each community must reassess what it offers the marketplace (Fulton & Shigley, 2001, 6). Without an economic reason for being, communities are unable to thrive.

It goes without saying that economic prosperity in a community generally improves the lives of its residents. Beyond providing for the basic necessities of life, spending power above and beyond the minimum necessary to sustain life makes life more enjoyable. It allows people to purchase goods that make life easier, allowing them more free time to concentrate on other activities. Increased economic prosperity flows into the community in the form of taxes, allowing for the construction and maintenance of community infrastructure.

It is said that everything that isn't grown, has to be mined. While originally intended to draw attention to the necessity of mining, it also makes a good point about the extremely limited number of sources of raw materials available to us. Fortunately, those few sources are abundant with the raw materials we process and put to use everyday. By harvesting these raw materials provided by the local environment and adding value to them, wealth is created, and economic prosperity follows. If there is continuing reliance on the environment and what it can produce, then it is important to maintain a stable and productive environment so that the present and future generations can continue to benefit from it.

In the event of economic decline, rural residents tend to cling to beliefs of individualism and frontier values, and blame themselves for decline. Economic problems may be tackled at a larger scale by state or federal action, but this undermines the sense of community and makes it all the more difficult for the local area to respond to changing economic conditions (Jakle and Wilson, 1992, 210). Rural communities have strong social systems they depend on to maintain their economic system, and the ability of a rural community's economic foundation to weather difficult times is tied to the social stability of the community.

A strong **social foundation** is also a key element of sustainable development. In any community of people, social networks are formed among those who work together, live near each other, or simply share a common interest. These social networks are at the core of what makes a real community, a place where people have decided to create a series of relationships among themselves for the betterment of themselves and the community as a whole. It is in these types of communities that people feel safe letting their children grow up, develop community events to bring people together, and form civic groups.

In a small town with a faltering economy, the young and skilled are more likely to seek opportunity elsewhere, leaving behind an older population and the unskilled workforce. Resulting declines in real estate prices attracts a less-educated class of new residents, one which will be less able to pay for housing and community improvements beyond the minimum necessary to provide shelter. The community can then enter a state of poverty, driving out the remaining professionals and skilled workers (Jakle and Wilson, 1992, 210). The community's social structure has fractured, as changing economic conditions caused rapid in and out migrations of people.

Beyond improving people's lives financially, stable and increasing incomes also contribute to the social well-being of an area. A predictable stream of income allows people to settle in an area permanently, and makes it more likely that they will buy a home there, and maintain it as an investment. In a community with strong social bonds, these personal connections are more likely to have a positive influence, thus giving people a reason to weather economic difficulties and stay in the community.

A strong community bond infers an attachment to both the people of an area and place in which they live. This attachment can also foster stronger environmental stewardship in a

community. Residents with a vested, long-term commitment in a town are more likely to demand a cleaner environment, whether it is for the air they breathe, the river where they get their water supply, or the mountains where they hunt and camp. While demands for environmental compliance frequently come from the outside, these are usually broad-reaching solutions attempting to solve a problem over a large area. A well-developed community social network is better able to address some environmental problems as a local problem, address their grievances to the appropriate local entity, and target the problem as a threat to their own lifestyle. A unified local voice can bring adequate pressure on organizations to go beyond the legal requirements for environmental stewardship, in the name of creating a better community for all.

The third leg of sustainability concerns the **environment**. Our environment provides all that is necessary for us to live—the air, food, and water we need every day. It is the source of all natural resources that is used in both raw and processed forms. As people continue to place increasing demands on the environment, it is important not to cause irreparable damage to the natural systems we depend on. Society's responsibility is not only to minimize pollution and damage to the environment for its own sake, but to consider the needs of the generations that will follow. If progress is to be sustainable, future generations' need for natural resources and a clean environment must be taken into account in today's decisions.

Economic prosperity can often influence the environment in ways that society doesn't often think about. Today, many people are concerned with the negative effects of development on the environment. Human demands are increasingly encroaching on sensitive habitats, disturbing ecosystems, and polluting resources necessary for both human and animal alike. While human demands on the environment will continue, there are ways to continue development while minimizing our impact on the natural systems we both depend on and enjoy.

A community with a strong economic foundation is better able to pay for the technology that minimizes pollution and make efficient use of natural resources than that of a weak economy. In a perpetuating cycle of improvement, improving economic conditions can lead to better health conditions through better education, sanitation, and nutrition. This in turn leads to higher productivity, thus again leading to better economic conditions (Leirner, 2006, 494). Better educated, healthier employees come to understand the link between their own health and a healthy environment.

A clean environment also plays a role in the social development and maintenance of a community. Communities with healthy, clean environments are more attractive places to live, and cause fewer health problems for residents. People who live in these communities are better able to enjoy their surroundings, whether it is a hike on a nearby mountain or simply enjoying a clear view of a distant vista.

While sometimes people are willing to trade the benefits of a clean environment for economic security, these tradeoffs are usually temporary (Hand and Macheski, 2003).

Once the economic benefits are gone, the area is stuck with the undesirable environmental damage.

In summary, sustainable development depends on the interrelationships between economic, social, and environmental factors to allow preserving what is available today while anticipating the future. A focus on any one of the three could be used to plan for improved living conditions, but sustainable development brings the three factors together and brings about a whole new set of ideas concerning how one decision will affect the others, each being equally important to the longevity of a community and the quality of life. Sustainable development thinking and active implementation require a much broader set of considerations in the development, operation and closure of mines.

3. The Role of Sustainable Development in a Resource Management Plan

Sustainable development is more than simply finding a way to extend the benefits of an existing enterprise. Sustainable development is in many ways a process, one that ensures adherence to principals of fair play, that the benefits of a project will benefit the whole, and that those who will be most affected by a project will have input on its development and implementation. Sustainable development is a noble cause as a stand-alone philosophy, but is difficult to put into law or regulation because it is so open to interpretation. Also, sustainable development works on many different scales, and what represents sustainable development for one community would be wholly inappropriate for another community 100 miles away. This is why a Resource Management Plan at the BLM Field Office level is appropriate for implementing sustainable development.

3.1. Precedent for Sustainable Development in the BLM

Sustainability and Sustainable Development are concepts that have been an integral part of the BLM for many years. While the current specific definition of sustainable development is relatively new, the concepts included in sustainable development have been around for quite some time. Congress has already included many of these concepts in U.S. environmental and planning laws.

The purpose of the National Environmental Policy Act of 1969, 42 U.S.C.4321 – 4347, is:

To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man . . . (NEPAnet).

Section 101 of NEPA states:

(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature

can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

These clauses from NEPA read like an unrefined version of the most commonly accepted definition of sustainable development proposed by the Brundtland Commission in 1987 (provided in Section 2).

While at first glance they may not appear identical, these statements aim to harmonize the relationship between humans and the environment so that people may continue to benefit from the natural abundance of the environment, without endangering the very systems we depend on for the necessities of life.

On the BLM Nevada website, there is a page entitled “BLM Nevada Vision” that outlines the BLM’s role as manager of approximately sixty-eight percent of the land within the state of Nevada. It acknowledges the importance of the land and its resources to the economy of the state, and under the heading of “The Character of our Communities” states:

We want to see economies that are healthy and sustainable for many generations to come. We want to see communities where multiple employment and entrepreneurial opportunities exist . . . We want to see a Nevada where public lands will help to sustain communities and economies (BLM Nevada Vision).

This establishes that one of the long-term goals of the Nevada BLM is to create opportunities for Nevada’s communities through the use of public lands and their resources. This goal is to be balanced against the Nevada BLM vision to preserve the character of the landscape, preserve cultural and social values, and protect ecosystems, all while maintaining access to the important resources found on public lands (BLM Nevada Vision). Again, this vision is similar in purpose to the goals of sustainable development, and illustrates how, in several ways, many of the tenets of sustainable development have already been implemented into BLM land management.

Also, as early as 1997, a release entitled *BLM Public Land Statistics 1997 Part 1; Land Resources and Information* stated:

To meet today’s changing and diverse demands, the BLM is changing its management of the public lands. To maintain the health of the public lands, the agency is taking a “big picture” or landscape approach to land management. This promotes both biological diversity on the public lands and the sustainable development of their myriad resources. The BLM’s mandate under the Federal Land Policy and Management Act of 1976 (FLMPA) is to manage the public lands for multiple use, while protecting the long-

term health of the land (Land Resources and Information, 1997).

This document ties together the similar goals of FLPMA and sustainable development. Sustainable development goals closely parallel those of federal land management agencies, and can be easily implemented within the existing legal framework that governs the BLM's administration of Public Lands.

Going further than similarities between the laws that govern the actions of the BLM and mission statements that provide direction for policy and the guiding definitions of sustainable development, there are specific policies in place to ensure that BLM management actions consider the social, environmental, and economic impacts before certain decisions are made.

In 2000, the BLM Land Use Planning Manual, under the heading of *Planning Approach* states that:

Planning decisions will also be developed in concert with sustainable development concepts. The concepts include a vision of economic prosperity, a healthy environment, and a just and equitable society. These sustainable development concepts are consistent with the mission and goals outlined in the BLM's Strategic Plan (BLM Manual 1601, Rel. 1-1666, 2000, 1601.06.A).

This establishes the necessity of including the concepts of sustainable development into the land use planning process, and how those concepts are in line with the BLM's mission.

In April of 2002, the BLM, in cooperation with the USDA and the US Forest Service, issued a brochure *Sustainable Development and Its Influence on Mining Operation on Federal Lands—A Conversation in Plain Language*. This brochure explains the basic tenets of sustainable development, and the definitions that have evolved from United Nations (UN) meetings. The paper does not establish policy for the BLM, but it does “reflect current thinking about how sustainable development principles could apply to mining operations on federal land.” It goes on to state that the BLM has “embraced sustainable development because the concept is complementary to and consistent with each agency's mission to provide for many uses of federal land . . . [including] developing natural resources and working with stakeholders to achieve a sustainable future for our lands and our communities (Sustainable Development and Its Influence, 2002).

In April 2003, the BLM Washington Office announced an award program to recognize the contributions of mining toward sustainable development in the areas of Locatable Minerals, Mineral Materials, and Solid Leasable Minerals. These awards went beyond recognizing mine operators who successfully completed reclamation after the cessation of

mining activities, it recognized those who went beyond the requirements and contributed to the community through the sustainable development foundations of economic security, social responsibility, or environmental health (Instructional Memorandum No. 2003-150, 2003). This program continues to annually recognize mine operations that exhibit responsible mineral resource development.

In October 2003, Kathleen Clarke, Director of the Bureau of Land Management, and Dale Bosworth, Chief of the US Forest Service, both signed a Statement of Support for Sustainable Development and Mining. They were supporting the Plan of Implementation, which was signed by the United States and 192 other countries at the World Summit on Sustainable Development in Johannesburg, South Africa in September 2002. This Plan of Implementation included support for efforts to “enhance the participation of stakeholders, including local and indigenous communities and women, to play a role in minerals, metals and mining development throughout the life cycles of mining operations, including after closure for rehabilitation purposes . . .” (Sustainable Development Minerals Applications, 2003). This statement committed the United States to the Plan of Implementation, and, among other things, demonstrates the BLM’s commitment to the concept of sustainable development, and reiterates the intent of Congress when it implemented the Mining and Minerals Policy Act of 1970 (Information Bulletin No. 2004-035, 2003)

Finally, sustainable development was made a formal part of BLM Policy with the issuance of a statement by Director Kathleen Clarke on April 21, 2006. In this document, the BLM endorsed the *Sustainable Development Plan of Implementation* as defined at the World Summit on Sustainable Development in Johannesburg in 2002. This endorsement applies to mineral resources on public lands managed by the BLM, and encourages “Social, Environmental, and Economic considerations before decisions are made on mineral operations. The BLM actively encourages development by private industry of public land mineral resources, and promotes practices and technology that least impact natural and human resources” (Bureau of Land Management—Energy and Non-Energy Mineral Policy).

3.2. NEPA, FLPMA and the Resource Management Plan

In 1969, the federal government established a national policy of environmental protection in the National Environmental Policy Act of 1969 (NEPA). Among NEPA’s primary requirements is the stipulation that federal agencies consider the environmental consequences of their actions (Cullingworth & Caves, 2003, 146). For specific activities, this can take the form of environmental impact statements or environmental assessments, depending on whether the action is expected to have a significant impact on the environment (Cullingworth & Caves, 2003, 260).

According to NEPA , the purpose of the legislation is “. . . [t]o declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man . . .” (NEPAnet).

In 1976, Congress passed the Federal Land Policy and Management Act of 1976 (FLPMA). FLPMA changed the BLM mission from one of land alienation and resource use oversight to one of general land retention (all the homesteading laws were repealed) and active land and resource management. Under FLPMA, the public lands must be managed under the principles of multiple use and sustained yield. To achieve these goals, land use plans, which include both Resource Management Plans (RPMs) and the earlier Management Framework Plans (MFPs), are created to guide the management of public lands at the field office level in a way that is in line with the intent of Congress as stated in FLPMA (Land Use Planning Handbook, 2005, 1).

3.3. Hard Rock Mining on BLM Administered Public Land (43 CFR 3809)

The purpose of 43 CFR Subpart 3809 is to “prevent unnecessary or undue degradation of public lands by operations authorized by the mining laws” (Subpart 3809.1(a)—Surface Management, 742). Its purpose was to prevent undue degradation of public lands subjected to mining development by requiring the reclamation of disturbed areas.

When an individual or mining company proposes to develop a mine on public land, they must file a plan of operations with the BLM, detailing plans for the pre-operational planning and construction of the mine, the operational life of the mine, and the post-operational land rehabilitation. Each of these phases must conform to law, and also conform to the land use plan for that BLM District (Subpart 3809.420(a)(3)). While post-mine uses are permissible under law, it is in the Resource Management Plan that the obstacles to sustainable development can occur. It is here that local input can encourage implementation of approaches to sustainable development.

3.4. The Resource Management Plan as an Ideal Venue for Implementation of Sustainable Development

In several ways, a BLM RMP already has many of the tenets of sustainable development incorporated into the making of the document. As a planning document formed from public participation, a BLM RMP reflects the will of the people as to how they would like to see their public resources used. The power to enforce the decisions in the document comes from a democratically elected government, bound by rules that protect the rights of the minority. Each of these ideals is a necessary part of the RMP planning process, and also a requirement for working toward sustainable development. These and other reasons make the RMP an ideal place to implement sustainable development, to ensure that decisions made about the use of resources today consider the impacts on future generations.

A BLM land use plan is an important document. It ensures that lands are managed in accordance with law, that goals for the resource are set, and ways these goals are to be met are agreed upon (Cullingworth & Caves, 2003, 6). Within the process of planning lies the room necessary to implement sustainable development. It is here that the

stakeholders can evaluate the management alternatives and determine which are in the local interest to work toward sustainable development.

Both sustainable development and the resource management plan are products of local will. They reflect the local will of the people, tempered by the boundaries of law. No permitted activity in the resource management plan can violate the law or the rights of individuals as guaranteed in the Constitution. In this way, local will can be expressed without violating the rights of others.

The tenets of sustainable development require that local participation take place in deciding future actions. The creation of resource management plans also require the involvement of those to be affected by the document (Land Use Handbook, 2). It is logistically impossible to have an entire population of an area be willing or able to attend meetings to express their desires about how local resources should be used. Sustainable development requires that a group of identified stakeholders representing the interests and population of the area make decisions about future progress toward sustainability. Similarly, the resource management planning process usually involves a resource advisory committee. In essence, both are groups believed to represent the public at large, giving a voice to the different segments of society and the interests of the area.

3.5. Local Decisions About Matters at the Field Office Level

The land use plan also provides great leeway so that local communities can exercise self-determination and local control. The resource management plan is written at a level that includes several communities united by geographic proximity and somewhat similar natural resources and economies. Because the scale of the RMP is not too large, these communities are able to exercise direct influence on the RMP that will guide decisions affecting the future of the community. It is at this local level that sustainable development can be best implemented. If a community wishes to move toward sustainable development, implementing it into the local field office resource management plan takes advantage of the wide array of allowable activities that can be placed in the plan. The BLM RMP is written for areas small enough to assure significant local control while covering an area large enough to make a real contribution to sustainability.

The local population also maintains control over permissible activities through RMP reviews, so that there is general adherence to the intent of the actions incorporated into the plan. At the time a resource management plan is written, not all future circumstances can be predicted. Plans are often in place for twenty to thirty years, making certain parts of the original plan obsolete and others lacking for dealing with current issues. In working toward sustainable development, it is necessary for local groups to review previous decisions, and make changes where necessary. The review process incorporated into resource management plans serves the same function. In both cases, those most affected by the decisions have the opportunity to periodically review those decisions and determine if they are still appropriate.

3.6. Regulatory Framework

In previous land use plans, well-intentioned decisions were determined to change the legacy of mine sites in Nevada. Historically, a mine could be abandoned after it stopped being profitable, and the change in the landscape considered one of the costs of progress. Eventually people realized the immense environmental damage that was done by these abandoned mines, and demanded that something be done about it. The answer was single-use planning and permitting. A mine would be permitted on public land, under the condition that a complete reclamation would follow. Toxic sites were to be cleaned up, equipment removed, and the land recontoured and stabilized. The idea was that the law required the mine to be permitted, but when the mining ended (for economic, labor or other reasons), the land was to revert to public land status like any other piece of BLM managed land.

One of the shortcomings of this single-use permitting was the loss of possible future use of the land. When a mine enters its closure phase, it has invested in the infrastructure necessary to operate the mine. Permanent buildings, roads, and power lines were constructed to service the mine over its expected life, and often beyond. Large pits have been dug into the earth, at a scale that would make pits dug for other reasons seem small in comparison. Under single use permitting, all of these features must be returned to their original state, despite possibilities of other uses for this infrastructure that could continue to contribute income to the local community well beyond the mines closure.

An example of single-use permitting is the Denton-Rawhide Mine near Hawthorne, Nevada. After closure of this mine in 2002 two further uses of the mine were proposed. One continuing use was as a landfill, which would make use of the improved road and rail connections to the mine, as well as the already excavated pit. Another proposal, which could have co-existed with the proposed landfill, is a wind energy generation facility. Using the existing power infrastructure of the mine, proposed windmills would have contributed up to two megawatts of power to the local power grid. While both of these further uses are allowable under law, the obstacle to the further use of this land was the local Resource Management Plan, which did not permit land disposals in the area of the mine.

If permitted in a resource management plan, there are several tools that can be used to change land use status, and make the continued use of disturbed mined lands possible. The first is through authorizations, such as rights-of-way (43 CFR 2800), and leases, permits, and easements (43 CFR 2920). These tools would make possible the continued existence of power lines and roads necessary to support a continued use of the formerly mined land.

The primary option for the reuse of the disturbed mined land itself is disposal. Very few business uses other than mining are approved for public lands, so alienation of land frees the land from this restriction, and permits the function of different types of operations. The options for disposal of mined lands are exchanges (FLPMA, Sec. 206; 43 CFR

2200), land sales (FLPMA, Sec. 203; 42 CFR 2710), conveyance of mineral estate (FLPMA, Sec 209; 43 CFR 2720), and transfer of land under the Recreation & Public Purpose Act (FLPMA, Sec. 212; 43 CFR 2740). Additionally, withdrawals and acquisitions are possible.

3.7. Implementing Sustainable Development into the Resource Management Plan

During the scoping process for the Winnemucca RMP between March and May 2005, input was received requesting planners to “Encourage sustainable development in your RMP” (Scoping Summary Report, 88). This opened the door for the inclusion of sustainable development into the RMP, but there was no precedent to use as a model. Because of the advanced stage of development of the RMP and limited resources, the inclusion of sustainable concepts was limited to minerals, lands and realty and socio-economics.

As sustainable development had never been implemented into a BLM field office RMP in the past, this research project was funded at the Mining Life-Cycle Center at the University of Nevada, Reno to study the implementation of the tenets of sustainable development into the BLM Winnemucca Field Office Resource Management Plan. A number of meetings were held with BLM personnel as well as the Advisory Board to develop a common thread in the thinking process. Reviews were made of national level indicators developed by the Sustainable Minerals Roundtable (Shields, et al, 2003), the Seven Questions to Sustainability (ISSD, 2002) and other approaches. It became clear that there were a number of activities that must be considered when including sustainable development in the RMP, these include:

- Make sure that the RMP team understands sustainable development concepts. This can be achieved through presentations to the team, participation of sustainable development experts in meetings, etc.
- Include sustainable development concepts in public presentations related to the scoping study.
- Engagement. The RMP should incorporate the requirement for ongoing engagement in all phases of the plan implementation and review. Note that development of the RMP follows the NEPA process and therefore public scoping and public hearings are included. These activities can be included in the development of the RMP without getting true engagement in the RMP implementation, which can be 5 to 20 years depending on budgetary realities. Engagement requirements, including the identification of stakeholders and their inclusion, in the development of Plans of Operations and supplements can be part of the RMP implementation.
- Include sustainable development concepts in as many resources as possible (note for the Winnemucca RMP only minerals, land and realty and socio-economics are included).
- Develop alternatives under each resource that includes sustainable development in concept and practice. These may include a requirement for interacting with multiple agencies (Federal, State, Local and Native-American) in decision-

making, engagement with stakeholders, development of indicators to measure success towards sustainable development, continuous improvement by reviewing the progress towards sustainable development and making adjustments as identified, and the application of risk assessment and risk management.

- Include viable options for changes in land status of disturbed mined land to allow productive post-mining land use. These options may include land disposal as well as changes in right-of-way. The process for accomplishing this should be clearly spelled out in the RMP.
- The themes of the Seven Questions to Sustainability are a powerful tool to review the contributions of an RMP to sustainable development (Van Zyl, et al, 2007). A close review of this approach during the development of the RMP can provide insight into the use of it as a review/audit tool and may also shape the development of management actions in the RMP.

Incorporating sustainable development in an RMP combines both process and technical aspects. For example, the process side requires that multi-stakeholder processes are in place and that there is broad engagement. The technical aspects require that high quality technical approaches, such as baseline studies, impact assessments, etc. be carried out. The RMP manager must work with the stakeholders to find the correct balance between process and technical aspects.

4. Sustainable Development Indicators

To monitor the progress of an implemented course of action toward sustainable development, it is necessary to develop a set of indicators. Just as a wildlife census may indicate the number of a threatened species for an area and stubble height may indicate grazing pressure, sustainable development indicators can give an idea of whether or not a set of actions are leading to the desired outcome.

Sustainable development is not something that can be measured directly. It is a concept that is applied to other systems, and therefore measured through its impact on those systems. In a Resource Management Plan, sustainable development can be measured through the contribution made by the RMP to the economic, social, and environmental benefits to the region. Through the selection of appropriate indicators, the benefits of sustainable development can be quantified, and progress toward sustainability measured.

In a recent publication of the International Council on Minerals and Metals (ICMM) three types of indicators are identified: input indicators, output indicators and outcome indicators. Table 3 provides this description of indicators from ICMM (2005).

Table 3
Description of Indicators (from ICMM, 2005)

Effective management, monitoring, and evaluation depend on the identification of effective performance indicators. Effective performance measurement needs to use appropriate units for measuring change; to be able to distinguish between inputs, outputs, and outcomes; to measure effectiveness and efficiency; and to assess both qualitative and quantitative dimensions of change.

- **Inputs:** Input indicators measure inputs such as money or time contributed to, for instance, development activities and/or processes conducted, number of meetings held, or number of studies conducted. Input indicators are important in managing resources and ensuring accountability of development facilitators but do not, however, tell us anything about how successful, or otherwise, development activity has been.
- **Outputs:** Output indicators measure the direct results of community development projects (for example, numbers of children vaccinated, numbers of people trained in agricultural methods, or school completion rates).
- **Outcomes:** Outcome indicators measure longer term changes that are the desired return on investment in the project (for example, measurable change in the community's quality of life, health, or economic well-being). Outcome indicators are the best measure of how successful, or otherwise, development activity has been.

There are certain qualities shared by good indicators designed to measure sustainable development. These desired qualities aid in the creation of a set of indicators that will accurately measure the quality in question without being unnecessarily difficult to repeat. The qualities of a robust and ideal economic, environmental, and social indicator are (Hilson and Basu, 2003):

- Be easy to identify and measure
- Be functionally important in the ecosystem
- Have a high inputted value
- Be relatively sedentary
- Have modest technological requirements
- Be sensitive to the stress in question
- Have mechanisms whose response should be understood
- Be quick to respond to stressors
- Be low in ambiguity

An indicator chosen with these qualities in mind is most likely to provide an accurate measure of the contribution toward sustainability, and avoid the noise or interference of other processes at work.

An additional consideration when selecting indicators is scale. Sustainable development can be implemented at many different levels, from one covering an entire country to one focusing on a single community. Because these different levels of organization will require different implementation plans for sustainability, their indicators will differ as well. Choosing the appropriate scale is a matter of determining the area of influence expected to be affected by sustainable development decisions. Choosing an indicator at too small a scale may miss important effects adjacent to the chosen area, and choosing one at too large a scale may cause the effect of sustainability decisions to be lost in the background noise.

Processes have been proposed for the development of indicators that measure contributions to sustainable development. These processes include stakeholder involvement and broad thinking about the issues. Indicators are identified that represent local conditions and interests and are not generic to all conditions. ICMM (2005) suggests fundamentals of an approach for developing indicators as shown in Table 4.

Table 4
Fundamentals of Approach for Developing Indicators (from ICMM, 2005)

Development of program indicators is often best done as a group exercise. Performance measurement should be based on objectively verifiable indicators to ensure that measurements of change by one group are accountable to all stakeholders as well as being repeatable by other groups if needed. The important point is that there must be some objective means of verifying results (for example, test results for students or numbers of trainees completing a course).

- **Step 1:** Gather together people with knowledge of and interest in the programs you want to develop indicators for (in the case of an RMP identify the stakeholders in the region).
- **Step 2:** Brainstorm ideas for indicators, focusing on means of verification.
- **Step 3:** Prepare a list of indicators for each program. These can be included a management framework that you use. Examples of quantitative indicators may include (a) the frequency of meetings, the number of people involved; (b) growth rates; (c) yields, prices; (d) up-take of activity inputs (loans, school enrollment, seeds, visits to the clinic, children vaccinated); and (e) adoption/implementation of activity outputs (technologies, manuals, newsletters, or guidelines in use). Qualitative indicators may relate to (a) the level of participation of a stakeholder group; (b) stakeholder/consumer opinions, satisfaction; (c) aesthetic judgments regarding local amenity or lifestyle choices; (d) decision-making ability; (e) attitudinal change; (f) emergence of leadership; (g) ability to self-monitor; (h) development of groups and of solidarity; (i) behavioral changes; and (j) evidence of consensus. It is generally easier to measure behavior than feelings; behavior can be observed. So if an objective is to increase people's confidence in meetings, it may be appropriate to measure this by observing how often they speak and whether they speak clearly.

ICMM (2005) also suggests a logical framework for including indicators in the overall logical project development and decision process. Table 5 has been modified from ICMM (2005) to specifically address post-mining land use; note that it can also be modified for other aspects of the contributions that mining makes to sustainability.

Table 5
Logical Project Framework (adapted from ICMM, 2005)

Narrative Summary	Indicators	Measurement of indicators	Important assumptions
Goal: The goal of the post-mining land use for a site or region	Changes that will indicate the goal has been achieved (e.g. high level of skilled employability in community)	Statement of how data on goal are to be collected and measured	Assumptions for achieving the goal
Outcomes: The longer-term results of the post-mining land use	Conditions that will indicate outcomes have been achieved (e.g. increased skills level in community)	How data on outcomes will be collected and measured	Assumptions for achieving outcomes
Outputs: The direct measurable results of post-mining land use	Extent and nature of outputs (e.g. numbers of trained people)	How data outputs will be collected and measured (monthly reports structured output indicators)	Assumptions for achieving outputs
Inputs: The activities and resources located to the implementation of post mining land use projects	Implementation activities and budgets (by type and quantity)	How inputs will be monitored	Assumptions for providing inputs

Sustainable development indicators will be compiled for the monitoring section of the Winnemucca RMP. These will be directly focused on the Management Decisions included in the RMP. These are not available at this time and four generic Management Decisions will be used to provide some example indicators.

Indicators are listed below for the following generic management decisions with respect to operational and post-mining land use:

- Other activities at existing mine sites, e.g. wind energy;
- Land tenure: disposal of land. The operator purchases the land that contain all the facilities and post a financial assurance with the State (as the land is now private);
- Right-of-way authorization. This allows the BLM to issue a permit for the re-use of the existing facilities on public lands;
- Collaboration. Participate with a community sustainable development working group for input on re-use proposals or disposal.

Indicators are proposed for each of these topics in the sections below.

4.1. Indicators for Other Uses at Existing Mines

Decisions about other uses at existing mines depend on the location of the mine, local resources and the willingness of mine management to consider other uses. Potential other uses at existing mines may include generation of wind and solar energy; and use of mine waste materials for alternative uses (e.g. using tailings to manufacture tiles). A broader approach would be to consider Eco-Industrial Park development where there are synergies amongst a number of activities. A key requirement for an Eco-Industrial Park is the availability of energy and other resources.

The following are some typical indicators:

1. Number of other uses identified at existing mines.
2. Number of contacts with BLM, other regulatory agencies and local communities about other potential uses.
3. Number of contacts with potential partners to develop the other uses.
4. Number of other uses implemented.
5. Number of employees associated with other uses.

4.2. Indicators for Land Tenure

Changes to land tenure following mining can be done following a number of approaches depending on the decisions in the Resource Management Plan. These approaches may include land exchanges, conveyance of mineral estate, transferal of land, withdrawals and acquisitions.

The following are some typical indicators:

1. Time dependent land status maps and statistics for mine site and adjoining areas.
2. Number of meetings between BLM and mining company or others about land tenure.
3. Number of requests to change land tenure.
4. Number of meetings with and requests from stakeholders about land tenure (both supporters and detractors).
5. Number of land tenure changes granted.
6. Number of employees resulting from change in land tenure.

4.3. Indicators for Right-of-Way Authorization

Right-of-way authorization is one approach to allow further access to a mine site following closure; in this case there may not be a change to the land status at the mine.

The following are some typical indicators:

1. Time dependent maps and statistics for mine site and adjoining areas identifying right-of-ways.
2. Number of meetings between BLM and mining company or others about right-of-way.
3. Number of requests to grant right-of-way.
4. Number of meetings with and requests from stakeholders about right-of-way (both supporters and detractors).
5. Number of right-of-ways granted.
6. Number of employees associated with activities related to right-of-way.

4.4. Indicators for Collaboration

An essential part of contributing to sustainable development is collaboration between the BLM Field Office and stakeholders in the RMP region, including other potential users of the mine site following closure.

The following are some typical indicators:

1. Presence or absence of a mining and communities committee in the area (Field Office region or more local).
2. Number of BLM representatives on the committee.
3. Frequency of committee meetings.
4. Number of open houses, information meetings, etc. on an annual basis.
5. Effectiveness of the committee in dealing with the broad group of stakeholders (obtain information through surveys, etc.)

5. Conclusions and Recommendations for Including Sustainable Development in Resource Management Plans

Sustainable development is a well accepted concept and experience is developing in applying these concepts to modern mining operations on public lands. It is essential that sustainable development thinking and principles be included in the development and implementation of new Resource Management Plans. The BLM has extensive guidance in the application of sustainable development principles throughout the agency and specifically with respect to land use planning.

Economic activities related to mining are important drivers for the development of sustainable communities and their abilities to limit environmental impacts. Communities with healthy, clean environments are more attractive places to live. Sustainable development depends on the interrelationship between economic, social and environmental factors to allow preserving what is available today while anticipating the future.

The BLM policies and guidelines encourage the application of sustainable development approaches to planning and management of public lands. There are multiple guidance and policy documents that encourage the application of sustainable development to BLM activities.

The RMP reflects the determination and input from the local communities and their wishes in managing public lands. If a community wishes to move toward sustainable development, implementing it into the local field office resource management plan takes advantage of the wide array of allowable activities that can be placed in the plan. The regulatory framework also allows considerable leeway for the change in land use status through various options for disposal and right-of-way.

Based on the outcomes of this research the following recommendations are made about the processes and approaches for including sustainable development in RMP's:

- Make sure that the RMP team understands sustainable development concepts. This can be achieved through presentations to the team, participation of sustainable development experts in meetings, etc.
- Include sustainable development concepts in public presentations related to the scoping study.
- Engagement. The RMP should incorporate the requirement for ongoing engagement in all phases of the plan implementation and review. Note that development of the RMP follows the NEPA process and therefore public scoping and public hearings are included. These activities can be included in the development of the RMP without getting true engagement in the RMP implementation, which can be 5 to 20 years depending on budgetary realities. Engagement requirements, including the identification of stakeholders and their inclusion, in the development of Plans of Operations and supplements can be part of the RMP implementation.

- Include sustainable development concepts in as many resources as possible (note for the Winnemucca RMP only minerals, land and realty and socio-economics are included).
- Develop alternatives under each resource that includes sustainable development in concept and practice. These may include a requirement for interacting with multiple agencies (Federal, State, Local and Native-American) in decision-making, engagement with stakeholders, development of indicators to measure success towards sustainable development, continuous improvement by reviewing the progress towards sustainable development and making adjustments as identified, and the application of risk assessment and risk management.
- Include viable options for changes in land status of disturbed mined land to allow productive post-mining land use. These options may include land disposal as well as changes in right-of-way. The process for accomplishing this should be clearly spelled out in the RMP.
- Close consideration of the themes from the Seven Questions to Sustainability during the development of the RMP, can provide insight into the use of it as a review/audit tool and may also shape the development of management actions in the RMP.
- Develop a set of indicators for each of the resource areas that can measure the progress towards sustainable development.

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Appendix A

Sustainable Development Concepts and Discussions

A.1 Historic Perspective on Sustainable Development (from Gibson, et al, 2005)

Sustainability as a term and rough idea appeared in the early 1970s, in response to the two previous decades' deepening worries about damages and risks, development failures and evident growth limits. When global environmental concerns were explored in the United Nations' 1972 Stockholm Conference on the Human Environment questions arose immediately about how to reconcile environmental protection with advancement in wellbeing for the world's poor. In a book linked to the conference, Barbara Ward and René Dubos² (1972) suggested 'sustainable development' as the way forward. The idea was apparently premature. Where they went beyond agreeable environmental matters, the Stockholm diplomats did little more than paper over the tensions between the growth worries of the wealthy nations and the development aspirations of the poor. Professionals in agencies with conservation and development aid responsibilities continued to wrestle with their overlapping tasks, attempting linked approaches under various titles: 'environment and development,' 'development without destruction,' 'environmentally sound development' and 'eco-development.' None of these attracted much attention outside a limited circle of international agencies and associated non-government organizations, but they helped establish a foundation of thinking about the reconciliation of two unavoidable obligations.

Also in 1972, broader public attention to some of the underlying concerns was spurred by the Club of Rome's extraordinarily popular report on its computer projection of trends in resource use, pollution, food projection, population and industrial output (Meadows et al³, 1972). The computer generated scenarios were primitive and vulnerable to misinterpretation as predictions of the future. But the report renewed attention to biospheric limits and spurred lively debates about whether and when economic growth and technological advance might contribute to solutions as well as to deepening problems.

Eight years later conservation interests came to the sustainability idea from a somewhat different direction. Gradually recognizing that wildlife could only be protected if their habitats were maintained and that this was only possible if the local people had viable livelihoods, the International Union for the Conservation of Nature and Natural Resources, the World Wildlife Fund and the United Nations Environment Programme, issued a *World Conservation Strategy* with a subtitle, 'living resource conservation for sustainable development' (IUCN et al⁴, 1980). But this too was just a step in a gestation

² Ward, B and Dubos, R (1972) *Only One Earth: the care and maintenance of a small planet*, Deutsch, London

³ Meadows, DH, Meadows, DL, Randers, J, Behrens, WW (1972) *The Limits to Growth: a report for the Club of Rome's Project on the Predicament of Mankind*, Potomac Associates, New York

⁴ IUCN, UNEP and WWF, International Union for the Conservation of Nature and Natural Resources, United Nations Environment Programme and World Wildlife Fund (1980) *World Incorporating Sustainable Development into the Resource Management Plan Process* November 26, 2007

period. The references to sustainability in the Ward and Dubos book, the conservation strategy document and several other works received limited public notice. It took some further years for the emerging concerns about growth limits, development failures and the risks and damages of technological adventures to merge and mature, and for a focus on problems to shift to a focus on what to do. By the mid 1980s, however, the time was ripe.

In late 1983, Norwegian Prime Minister Gro Harlem Brundtland was asked by the Secretary-General of the United Nations to chair an independent commission on how to deal with the tensions that had arisen in Stockholm. Her commission's mandate was to determine not just how to protect the environment but how to eliminate poverty and promote general progress on one limited and already abused planet. It was not an easy assignment. Poverty and environmental degradation remained two of the great intractable global problems. Moreover, they appeared to demand opposing solutions. Overcoming poverty demanded expansion of economic activity and opportunity; protecting the environment entailed restraint. Any imaginable solution would have to be both highly creative and sharply at odds with business as usual. And it would have to win support not just from Brundtland but also from the Commission's 20 other members, representing as many different nations and consequently a great diversity of conditions and cultures, ideologies and interests. It would be a marvel if they could agree a description of the problems, much less an innovative prescription for the future.

At the same time, it was an entirely sensible assignment. For decades the United Nations and its associated agencies had struggled separately with development and environment. Both were life-and-death matters and increasingly they were interrelated. Continuing environmental degradation was leading not only to local and regional resource depletion and damage to essential ecological functions, but also to cumulative effects that aggravated poverty and threatened global wellbeing. Meanwhile the failures or inadequacies of development initiatives in many places were leaving many people in destitution and insecurity while the gap between rich and poor deepened. These dynamics, combined with a continuing rise in human numbers, pointed to an ugly future of increasingly desperate poor people with little choice but to eat into their remaining natural capital – in a world which apparently could not support everyone at even a moderate European standard with current levels of technological and distributional efficiency.

The Brundtland Commission's solution – announced in its now famous report, *Our Common Future* (WCED⁵, 1987) – was sustainable development. It was at once necessary, brilliant, incomplete, filled with tensions, and wildly popular.

Environment and development, the Commission argued, had to be addressed together because they are interdependent – both as problems and as solutions. Poverty cannot be overcome in a world of ecological decline and resource depletion. Environment cannot be

Conservation Strategy: living resource conservation for sustainable development, IUCN, Geneva, Switzerland

⁵ WCED, World Commission on Environment and Development, GH Brundtland, chair (1987) *Our Common Future*, Oxford University Press, Oxford/New York

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rehabilitated in a world of deprivation and desperation. The aim of development must therefore be to build conditions and capabilities that will allow people to sustain themselves while also sustaining the environment that is the foundation for their lives and livelihoods. And the results must be lasting. It was hard to disagree. All 21 commissioners signed on to the concept, signaling and fostering widespread acceptance of the Commission's report and its argument.

The concept of sustainable development became the closest thing to an overnight hit that is imaginable for a product of international diplomacy. There were critics, certainly – arguing, for example, that the Brundtland agenda was contradictory, or too invasive, or too soft on the rich. But the critics had little effect. Within months of the report's release, national governments and government jurisdictions at other levels began to embrace sustainable development. Sustainability became the featured objective of government pronouncements on development initiatives, domestic programme agendas and international aid targets. Major corporations and business associations also claimed adherence. Shelves of academic treatises, consulting reports and policy documents were prepared. Sustainability became a household term. By 1992, when the United Nations held its first world conference on environment and development, an unprecedented number of national government representatives were willing to travel to Rio de Janeiro to refresh their vows of commitment to the pursuit of sustainability. Today sustainability is firmly embedded in the language of development – locally, globally and at every level between. It is in common use well beyond the fields of poverty reduction and environmental protection and beyond the halls of formal government. It is a huge success.

And a continuing disappointment. The enormous popularity of the notion among the great and mighty has been accompanied by more verbal adherence than practical implementation. While thousands of specific initiatives have been undertaken at all levels from the neighbourhood to the planet, they have so far remained mostly counterpoints to the dominant practice. Certainly they have had far too little evident effect on the two key trends that agitated the Brundtland Commission – the continuing degradation of ecosystems and resources, and the expanding gap between rich and poor.

Agenda 21, the major product of the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, was an ambitious compilation (40 chapters totaling 700 pages) of officially recognized needs for action (Robinson⁶, 1993). The document set out detailed action programmes, with cost estimates for their implementation, to address a long list of sectoral concerns including poverty reduction, technology transfer, climate change and hazardous waste disposal. While not all items were well specified and not all observers were satisfied that the best strategies had been adopted, 'hopes were high and expectations were great' (WSSD⁷, 2002).

⁶ Robinson, NA (ed) (1993) *Agenda 21: Earth's Action Plan - Annotated Oceana*, New York

⁷ WSSD, World Summit on Sustainable Development (2002) *The Road from Johannesburg: what was achieved and the way forward*, United Nations, WSSD, New York [<http://www.johannesburgsummit.org/>]

A significant amount of international as well as local discussion and research about sustainability followed the Rio conference. Valuable work was done to understand better how ecosystems work and how their integrity may be sustained. Similarly admirable efforts went into designing and applying more promising ways of fostering efficiency and equity, of helping communities build on their own social and material resources to establish sustainable livelihoods, of addressing problems with inter-generational implications, of identifying appropriate indicators of human and ecological wellbeing for all sorts of communities and ecosystems, and of understanding how to design for and adapt to continuing uncertainties. The UN and associated bodies also held a series of 'Rio Cluster' international conferences to deal with issues ranging from trade and development, fish stocks, pollution and human rights, to climate change, biodiversity and desertification. At the same time, many more immediately practical positive steps were taken in neighbourhoods and communities, in local government councils and in progressive corporate board rooms. At all levels and in numerous fields, sustainability was becoming an increasingly visible part of planning and problem solving.

But by 2002, when the Rio+10 gathering – the World Summit on Sustainable Development in Johannesburg – was held, it was abundantly clear that few of the 1992 expectations had been met. Apparently because of widespread failures to achieve measurable improvements, few of the participating countries submitted progress reports. Trends away from sustainability, however, were evident enough. Conference organizers reported that in the ten years following the Rio gathering, 'poverty deepened in many areas and environmental degradation continued unabated' (WSSD, 2002). And the new steps taken at Johannesburg did little to dispel the disappointments. While the Rio commitments were reaffirmed, some additional targets were specified, and new partnerships were announced, UN Secretary-General Kofi Annan was putting the most positive face on it when he called the Johannesburg summit 'a beginning' (WSSD, 2002).

A.2 The Essentials of Sustainability (from Gibson, et al, 2005)

The concept of sustainability has certainly demonstrated some staying power. Nearly two decades since the Brundtland Commission completed its work, still increasing numbers of governments, corporations and civil society bodies claim to be moving in ways informed by sustainability commitments, and practical applications continue to proliferate. Durability alone does not prove that the concept is coherent and useful. But it suggests that there is good reason to consider what qualities have contributed to the lasting interest in sustainability and whether these qualities might also be its defining essentials.

For our purposes, the essential qualities of sustainability – the shared basics of the concept – must be those that lie at the core of the idea and that should inform its application anywhere. They must be rooted in its origins and evident, at least implicitly, through the range of competing interpretations. They must be minimally controversial. They must not just recognize problems but also offer some guidance for positive response. And, if sustainability is to be established as a fundamentally coherent concept (however much conflict and diversity there may be in particular applications) for the

purposes of practical application in sustainability assessments at many scales from the local to the global, the essentials must together form a roughly complete whole.

Fortunately, it is not difficult to identify characteristics of sustainability that meet this test.

First, as we have seen, *the concept of sustainability is a challenge to conventional thinking and practice*. It was formulated as a broad response to persistent and fundamental concerns about the adequacy and long term viability of the prevailing approaches to progress, development and wellbeing. Most immediately, it arose out of linked worries about environmental degradation and development failures, but it was also rooted in more comprehensive critiques of decision making that gave little attention to the costs and limits to growth, to the risks of increasingly ambitious manipulations of nature, or to the complex and particular realities of communities and ecologies targeted for development. The concept represents the need for positive alternatives to the present, unsustainable path.

Second, as a response to these concerns, *the concept of sustainability is in all its formulations concerned about long as well as short term wellbeing*. It addresses persistent threats and values potentially durable solutions.

Third, *sustainability covers the core issues of decision making (the pursuit and maintenance of necessities and satisfactions, health and security, diversity and equity, ecology and community, preservation and development, etc)*. Arguably, sustainability is the proper central concern of decision making. It is not one item of a list of relevant considerations, but a broad conceptual framework and set of general values for integrating the full suite of relevant considerations. Some of the literature and practice has focused more narrowly and still usefully on, for example, environmental sustainability or community level sustainability. The full concept, however, is comprehensive of all factors, at all levels, that may affect the desirability and durability of future conditions.

Fourth, *sustainability demands recognition of links and interdependencies*. The key message of the Brundtland Commission, and of countless other serious deliberations about the prospects for human life on this planet, is that human and ecological well-being are effectively interdependent. However many layers of artifice we may construct, humans are ultimately and unavoidably dependent on biospheric conditions that are friendly to human life. And humans now play a huge role in manipulating biospheric conditions. Consequently, there is no serious strategy for preserving and enhancing ecosystem integrity that does not also involve ensuring human well-being. And vice versa. To some commentators on the Brundtland Commission's work, the crucial interdependencies involved an apparent contradiction. On the one hand, the Commission saw that it would eventually be suicidal to allow a further undermining of ecological life support systems, locally and globally. On the other, they saw that development was also required to eliminate destitution, ensure material security, and allow individuals and communities more choices and more power to exert greater control over the factors

affecting their lives. Accordingly the Commission advocated development with sustainability: initiatives designed and pursued in ways that would protect resources and ecological integrity over the long term while greatly improving human well-being, especially among the poor. Not everyone has been persuaded that this is possible. Some have argued for more emphasis on redistribution to avoid additional exploitation of nature. But sustainability adherents of all persuasions have accepted that interdependencies are powerful and must be respected.

Fifth, *sustainability must be pursued in a world of complexity and surprise, in which precautionary approaches are necessary*. The debates about sustainability and its implications have coincided with growing recognition that human and ecological considerations are linked in open, dynamic, multi-scalar systems, which are complex beyond full description. In such a context, prediction of future conditions is at best uncertain, and surprise is likely. Efforts to anticipate and avoid problems, and to pursue positive opportunities remain desirable and potentially effective. But overconfidence is perilous and precaution (in the form of back up plans, avoidance of unnecessary risk, planning for reversibility, etc) is wise.

Sixth, *the concept of sustainability recognizes both inviolable limits and endless opportunities for creative innovation*. A child of twentieth century ambivalence, it respects perils and risks, but also diversity and possibility. The concept's ancestry includes appreciation of biophysical limits to growth, the many indicators of vulnerability to social as well as ecological collapse, and the precautionary inclination. But sustainability has also been embraced as a reaction against single-minded economism, cultural uniformity, analytical narrowness and administrative convenience. Its adherents have attempted to expand and link models, frameworks and methodologies from many disciplines. And sustainability-centred inspiration has helped to spur an extraordinary range of local and larger initiatives – slow food and urban growth management strategies, micro-credit and wind farms, traditional knowledge preservation and car-free days. Arguably, this diversity in thinking and practice is as crucial to the pursuit of sustainability as precaution, appreciation of interdependency and concern for the long term.

Seventh, *sustainability is open-ended*. It is a set of principles to apply and processes to follow, not a state to be achieved. Sustainability must be pursued in a dynamic and complex world where there will always be unexpected stresses, emerging opportunities and shifting preferences, and where there will always be uncertainty and surprise. In such a world, no single, lasting solution is possible. Not even the goals are fixed (Robinson, et al⁸, 1990; Ravetz⁹ 2000; HKPD¹⁰, 2000: HKSDU¹¹, 2002).

⁸ Robinson, JB, Francis G, Legge, R and Lerner, S (1990) 'Defining a sustainable society, values, principles and definitions,' *Alternatives* vol 17(2) pp36-46

⁹ Ravetz, J (2000) 'Integrated assessment for sustainability appraisal in cities and regions,' *Environmental Impact Assessment Review* vol 20, pp31-64

¹⁰ HKPD, Hong Kong Planning Department, Government of (2000) *The Study on Sustainable Development for the 21st Century in Hong Kong*
[http://www.info.gov.hk/planning/p_study/comp_s/susdev/index_e.htm]

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Eighth, *the means and the ends are necessarily intertwined*. Sustainability is not just a matter of putting in place a system of compatible relations among social, ecological and economic factors. It is also a matter of culture and governance. How we build relations with each other, what habits of thought and behaviour we establish and how we go about making decisions are central to sustainability.

Finally, and perhaps most importantly for a discussion of assessment applications, *the concept of sustainability is both universal and context dependent*. The points above refer to the essential qualities or characteristics shared by the many and various versions of the concept. In the interests of providing a basic set of criteria for sustainability assessment decision making, the chapter 5¹² will go even further by proposing a short but broadly applicable list of core requirements for progress towards sustainability. To this extent, sustainability has a universal aspect, relevant not just to consideration of global scale issues but also local and regional ones, wherever they may be and whatever the particulars of the case. At the same time, however, sustainability offers no common blueprint, no single paradigm. While the shared characteristics discussed here and the core requirements outlined in chapter 5 have some substantive weight, are all dependent on elaboration and specification in context. As noted above, the concept arose in part as a response to the failures of narrow impositions and context-insensitive development. It is not the banner of a new civilizing mission to be led by the mighty and the expert. The concept of sustainability is perhaps best conceived as a substantively important but minimal framework requiring specification in and for particular places.

In other words, that sustainability cannot be defined as one set of characteristics and requirements. While there are some core basics, the implications and applications differ from one context to the next. In defining and applying the sustainability concept, the core basics are necessary but insufficient. Specification in context is also needed.

¹¹ HKSDU, Hong Kong Sustainable Development Unit (2002) 'Sustainability assessment', [<http://www.susdev.gov.hk/text/en/su/sus.htm>]

¹² Referring to the text by Gibson, et al (2005)