

Falling Free From the Sky

Water Resources  
and the  
Silver City Land Use Code

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by

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and

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WHEREAS: Water is one of the most valuable resources in this dryland community. Developing, operating and maintaining well water and delivery systems is expensive. Town wells deplete the aquifer, and electricity must be used to pump this water uphill, where it originally came from. Meanwhile, storm water runoff from urban hardscape (roofs, roads, etc.) produces way more water than all the wells combined, and can deliver it for free directly to one thousand places. In this remote mountain community, rainwater from metal roofs can easily be filtered to meet the most stringent drinking water standards. Water from roads and parking lots is ideal for irrigating fruit and nut trees, shrubs and grass to benefit our whole community. Greywater recycling to irrigate the landscape is another water resource that can reduce the burden on our well water delivery infrastructure. At present, our codes, and ordinances, as well as the institutional culture of our town do not recognize the value of stormwater or greywater, and cause us to spend huge sums of money to dispose of this valuable resource in a very destructive way. Note that if the budgets for water delivery, street repair, stormwater disposal, and erosion control. were viewed as one, it would make economic sense to start making changes right away. In this era of stalled economic recovery, we must become more practical and more frugal. It should be relatively easy for tiny Silver City to follow the lead of Tucson (who has adopted a water harvesting ordinance), and even improve upon what they have started.

THEREFORE: The Silver City Land Use Code will treat rainwater, snow and stormwater runoff, and greywater as important water resources, and substantial changes to the draft Land Use Code will be made to cost effectively optimize the benefits our community will receive from all of this water. This will naturally improve public safety and security in many important ways. The basic design of new streets and stormwater facilities will be changed, old streets and drainage systems will be retrofitted over time to take fair advantage of this water before sending it out of town in the big ditch more slowly and in a cleaner condition. Since part of the problem and its solution is on private land, a new program will be started when funds become available to teach property owners how to safely harvest water from their roofs and landscapes for their own benefit, and to

eliminate their contribution to runoff and erosion problems. Irrigation of landscaping with greywater will be required in new subdivisions and residential and commercial development. These changes will not be cleverly diluted in committees, so that the original intent will be made into a law that will accrue the most benefit to the people of our town in the long run. In addition, the council will direct staff to immediately start learning about water harvesting and greywater, and promoting it in their departments and in their interactions with the public. The floodplain manager will be directed to interpret the new Land Use Code very conservatively, keeping foremost the health of the watershed and the benefits of the waters to the people of our town.

**General Comments:** As concerned citizens and watershed experts, Van Clothier and Denise Smith are providing the following comments and recommendations on floodplain protection and use with regards to the draft Land Use Code Amendments to the Town of Silver City. Our comments are based on over 25 cumulative years of experience working within floodplains in the Southwest to enhance flood attenuation, reduce erosion, and protect natural resources (features that have ecological, economic, recreational, educational or aesthetic value).

Federal, state, municipal, and private funds as well as volunteer labor are being spent to protect and enhance the floodplains, including wetland and riparian areas, within and adjacent to the Town of Silver City, through sources such as the U.S. Environmental Protection Agency (EPA) 319 and wetland grants administered through the New Mexico Environment Department, and U.S. Fish and Wildlife's Partners for Fish and Wildlife Program. These efforts should be valued and recognized by the Town of Silver City and reflected in its Land Use Code.

We submit as a reference document, the EPA, "Statement of Procedures on Floodplain Management and Wetlands Protection", dated January 5, 1979. EPA recognized the importance of incorporating floodplain protection considerations into its planning, regulatory, and decision making processes over 30 years ago in order to restore and preserve the natural and beneficial values served by floodplains, and developed regulations to ensure that these important resources are not compromised. The suggested changes we are proposing are in concert with EPA's regulations, and have recently been adopted in communities nationwide, including large metropolises such as Tucson, Los Angeles and Seattle.

Section 4 of the document appears to lack specific guidance on maintaining the value of floodplains in relation to their natural and beneficial values, especially avoiding adversely impacting floodplains wherever possible and mitigating the adverse effects if impacts to floodplains are permitted. Without mitigation of individual floodplain impacts, the cumulative effect could result in the devastating loss of property and life that the Town wants to avoid. Fortunately, Water Harvesting is an elegant solution to the nuisance runoff problem that will save the Town money while creating a renewable resource for the community.

With all due respect to the Town of Silver City administration, we offer the following specific comments and recommendations.

**Specific Recommendations by page number:**

**p11** Article II. Definitions, Section 2.2 Definitions:

**Floodplain.** The flat area adjoining a stream channel constructed by the stream in the present climate and overflowed at times of discharge that has a return interval of 1-2 years. Floodplains modulate flood duration and intensity and are important energy dissipaters.

**Historic Floodplain.** A floodplain that is no longer overflowed by the 1-2 year return interval runoff event, because the grade of the channel has dropped.

**Impervious Surface.** Infrastructure including but not limited to roads, parking lots, sidewalks, gutters, driveways and roofs that do not allow water to soak into the ground and contribute to storm runoff.

**Natural Resource.** Features that have ecological, economic, recreational, educational or aesthetic value, such as flowing water and floodplains.

**Watershed Restoration.** To re-establish a setting or environment in which the natural processes of the watershed, including bank protection with riparian vegetation, and energy dissipation through floodplains can again operate.

**Water Harvesting.** Directing runoff from an impervious surface into a system of attractive earth basins and vegetated swales that convert nuisance stormwater runoff to a beneficial resource. A cistern could also be used in the case of a metal roof to provide irrigation or drinking water.

**Water Harvesting Curb Cut.** Cutting a curb to allow street and gutter runoff to flow into a water harvesting basin, where trees and other beautiful landscaping will take advantage of this resource.

**Water Harvesting Road Drainage.** Draining a road, whether it is paved or not, to regulate the accumulation of storm water runoff on the road surface or gutters or roadside ditches. The runoff is redirected at frequent intervals to attractive water harvesting basins that grow trees, and where possible to drainage ways or watercourses that the road had previously cut off during its construction or subsequent maintenance, restoring the health and function of these important landforms.

## ARTICLE IV. OVERLAY DISTRICT REGULATIONS

### 4.1 Floodplain Overlay District

#### B) Findings of Fact

**p91**            3) Flood frequency and flood height are increased by construction of impervious surfaces (roads, parking lots, sidewalks, driveways and roofs), and decreased by water harvesting cisterns, curb cuts, earth basins, and proper water harvesting road drainage. Present climate change appears to be increasing flood height. Downstream flood frequency and flood height are also decreased by appropriate tree and vegetation cover, proper grazing management, removal of impervious surfaces, and watershed restoration of uplands, stream banks, floodplains and wetlands.

**p91** C) Statement of Purpose

2) Minimize expenditure of public money for costly flood control projects and associated maintenance for irrigation of public landscaping by promoting water harvesting that will convert nuisance stormwater runoff to a beneficial resource for the community, and reduce the cost of developing additional water resources for landscape irrigation;

**p92** D) Methods of Reducing Flood Losses

2) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the initial time of construction by simply requiring said facilities to be located outside of flood hazard areas;

3) ~~Control the alteration~~ Eliminate the degradation of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters, and seek to restore natural floodplain and hydrological function through watershed restoration where it has been adversely impacted;

4) ~~Control~~ Eliminate filling, grading, dredging and other development that may increase flood damage;

6) Require water harvesting from all residential and commercial development and all new road construction plans, submitted after January 1, 2012. This activity will be governed by the Town of Silver City Water Harvesting Ordinance (to be written)

**p95** Y) Flood Protection System. Such a system typically includes ~~hurricane tidal barriers,~~ dams, reservoirs, levees or dikes and require costly capital outlay and long-term maintenance. These specialized flood modifying works are constructed in conformance with sound engineering standards but decrease the ability of natural systems to function properly.

**p95** BB) Functionally Dependent Use means a use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes fishing, water harvesting, stream restoration and planting native riparian vegetation. ~~only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities~~

**p99** F) Interpretation. In the interpretation and application of this section, all provisions shall be

2) Liberally construed ~~constructed~~ in favor of the governing body and the health of the watershed that supports our community; and

4.1.4 Administration

B) Duties and Responsibilities of Floodplain Administrator

**p100** 7) Assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained.

**p100** 9) When a regulatory floodplain has not been designated, the floodplain administrator must require that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM. ~~unless it is demonstrated that the cumulative effect of the proposed development will not increase the water surface elevation of the base flood more than one foot at any point within the community.~~

10) Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in Zones A1-30, AE, AH, on the community's FIRM which increases the water surface elevation of the base flood by more than one foot, provided that the community **first** applies for a conditional FIRM revision through FEMA. However, since stormwater runoff is a measure of a community's wastefulness, the floodplain administrator will not allow runoff to increase in any sub-watershed within the Town, and will actively promote watershed restoration, water harvesting and proper road drainage so as to decrease stormwater runoff over time.

<new section> 11) Review all applications for water harvesting and watershed restoration to insure that the plans are in accordance with the Water Harvesting Ordinance.

<new section> 12) Review all existing town impervious surfaces as time allows, and recommend the appropriate water harvesting retrofits to reduce stormwater runoff.

<new section> 13) Require experience and training in Natural Channel Stream restoration (Rosgen Level II training or equivalent) for all designers and builders of any alteration or relocation of a watercourse that drains an area greater than 80 acres. Not require an engineer stamp on designs of water harvesting earthworks or stream restoration projects.

<new section> 14) Allow the base level to be raised where a drainage easement has been created that will safely accommodate the higher water level, while providing channel storage that will reduce the velocity and stage of the flood for downstream reaches.

#### C) Permit Procedures

2) Approval or denial of floodplain development permit by the floodplain administrator shall be based on all of the provisions of this Section and the following relevant factors:

a) The danger to life and/or property due to flooding or erosion damage;

**p101** <insert this after section a, and re-label subsequent provisions>

b) The effect of the proposed facility on the health of the watershed.

#### **p102** D) Variance Procedures

8) Variances shall not be issued within any designated floodway. ~~if any increase in flood levels during the base flood discharge would result.~~

#### **p103** 4.1.5 Provisions for Flood Hazard Reduction

The flood protection in Silver City will eventually consist primarily of many small easy-to-maintain water harvesting earthworks distributed throughout the urban sub-watersheds wherever water starts to concentrate during a downpour. These water harvesting works will be designed and constructed in conformance with modern water harvesting principles that will convert stormwater to a beneficial resource on site.

A) General Standards. In all areas of special flood hazards the following provisions are required for all new construction and substantial improvements:

<insert these two new sections before section 1 and re-label subsequent sections>

1) No new construction or substantial improvements will be allowed below the base flood elevation. No variances will be made on this provision by any individual or committee.

2) Require water harvesting and greywater irrigation of landscaping for all new residential and commercial development. Require water harvesting for all new road construction. This will apply to all plans, submitted after January 1, 2012. This activity will be governed by the Town of Silver City Water Harvesting Ordinance (to be written)

**p104 B) Specific Standards**

3) Enclosures. New construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement shall all be built below base level without exception. ~~which are subject to flooding shall be designed to automatically equalize hydrostatic forces on exterior walls by allowing for the entry and exit of flood water. Designs for meeting this requirement must either be certified by a registered professional engineer or architect, or meet or exceed the following criteria:~~

a) ~~A minimum of two openings having a total net area of not less than one square inch for every foot of enclosed area subject to flooding shall be provided.~~

b) ~~The bottom of all openings shall be no higher than one foot above grade.~~

e) ~~Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwater~~

6) Water harvesting, watershed restoration, including designating drainage easements, increasing infiltration, and improving water quality, will be the primary methods to address flood hazards.

**p106 C) Standards for Subdivision Proposals.**

<insert this before section 1 and re-label subsequent provisions>

1) Require water harvesting from all new road construction plans, and require both water harvesting and greywater irrigation of landscaping for all subdivisions. This will apply to all plans submitted after January 1, 2012. This activity will be governed by the Town of Silver City Water Harvesting Ordinance (to be written), and the Town of Silver City Greywater Ordinance (to be written)

**p107 E) Floodways**

1) Encroachments are prohibited, including fill, new construction, substantial improvements and other development, within the adopted regulatory floodway. ~~unless it has been demonstrated through hydrologic and hydraulic analysis performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.~~ Exceptions from this provision may be made for water harvesting and stream channel restoration work that reduces downstream flooding through infiltration and channel storage, including work that hydraulically reconnects the stream to its historic floodplain, and restores or maintains natural function. The channel may be raised to access the historic floodplain where not precluded by development, and where a drainage easement is designated.

(Note: the only way to encroach on a floodway without increasing the flood level is by causing the velocity to increase. This is not acceptable.)

**p108** 3) Under the provisions of 44 CFR Chapter 1, Section 65.1 of the National Flood Insurance Regulations, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided the community first completes all of the provisions required by Section 65.12; however this Land Use Code is written to more strictly protect public safety and the water resources of our community, and specifically prohibits encroachments within the adopted regulatory floodway.

**p108** 4) Permitted Uses

d) Water Harvesting and watershed restoration.

**p109** 6) Conditional Uses

a) Uses ~~or structures~~ accessory to uses permitted in the floodway district

7) Conditional Use Standards

a) Fills

i) Any fill permitted must have a beneficial purpose, and the size of the fill must be related to achieving said purpose. Since encroachments are prohibited in section 4.1.5-E-1 above, fill may only be used to replace material that has been eroded away during the last two years. Fill may only be composed of earth materials (rocks, sand, gravel, dirt, plant materials, including living plants, logs and posts) or concrete. Tire bales and other garbage are specifically prohibited from being used as fill.

F) Nonconforming Uses

**p110** 2) If a nonconforming use or structure is destroyed by any means, including floods, to an extent of fifty percent or more of its value before the damage occurred, it shall not be reconstructed. ~~except in conformity with the provisions of this section.~~

ARTICLE V DEVELOPMENT STANDARDS

5.1.5 Subdivision Design Standards and Layout

A) Blocks

1) The length or shape of blocks shall be determined with due regard to: provision of adequate building sites suitable to the special needs of the type of use contemplated; needs for convenient access, circulation, control and safety of street traffic; water harvesting basins, and limitations and opportunities of topography.

B) Lots

**p116** 4) Depth, width, area and shape of sites or lots for commercial or industrial purpose shall be adequate for off-street service, parking facilities, and water harvesting and landscaping required by the type of use and development contemplated and as specified in the Code.

**p117** 6) All new streets in all new subdivisions will be drained at frequent intervals with curb cuts or other means to water harvesting earth basins. If there is insufficient room to build the basins in the right of way, the basins will be incorporated into the yard landscaping of the new lots, and recorded in the deeds as drainage easements.

**p117** Section 5.1.6 Land Dedication and Fees-in-Lieu

A) Parks, Playgrounds and Other Public Areas.

1) Land Dedication

a) For each single-family housing unit or unit in a multiple-family housing development, ~~0.04~~ 0.1 of an acre shall be set aside by the subdivider for public facilities, parks, open space floodplains, or recreation areas.

**p118** 2) Fee In-Lieu of Land

c) Monies accepted by the town in lieu of conveyance of land for public facilities, parks, or recreation areas shall be used toward the creation of or enhancement of a park or playground or for the purchase of flood prone lands which will be dedicated as open space in a nearby area.

**p122** 5.2 Streets – This entire section will be modified by the new Town of Silver City Water Harvesting Ordinance when it is written.

### 5.2.3

#### D) Curb/Gutter and Shoulders

**p125** 1) A 6” barrier curb with an 18” gutter is required on all urban street types. Roll curb may be used on rural streets or on urban streets with approval of the Public Works Director, if adequate separation between street and sidewalk is provided for pedestrian safety. All new streets in all new subdivisions will be drained at frequent intervals with curb cuts or other means to water harvesting earth basins.

2) Rural streets may be constructed without curb and gutter subject to the approval of the Public Works Director. Streets without curb and gutter shall have shoulders with stabilized surfacing planted with native grasses.

**p128** 5.2.6 Where a subdivision borders on or contains a railroad right-of-way, highway, or a natural physical barrier such as an arroyo the Town ~~may~~ will require a street 50 foot wide setback approximately parallel to and on each side of the right of way, ~~at a distance suitable for the appropriate use of the intervening land, as for a park, open space or recreational purposes. in residential zones or districts, or for commercial or industrial purposes in appropriate zones or districts.~~ These distances also shall be determined with due regard for the requirements of ~~approach grades and future separations.~~

**p130** 5.3 Alleys. This section will be modified by the new Town of Silver City Water Harvesting Ordinance when it is written.

### **p131** 5.5 Natural Resource Protection

New construction shall comply with the following standards. ~~unless compliance with a particular standard would prevent the construction of any permanent structure for a primary use of the land, or require the construction to violate another requirement of this Land Use Code. Where more than one buildable site exists on a parcel and all buildable sites would violate at least one of the following standards, the construction shall be located so as to comply with as many standards as possible.~~ These standards do not create liability on the part, or cause action against, the Town or its officials.

5.5.1 Hazard Areas. Land subject to hazardous conditions such as wildfire, landslides, gamma radiation, mud flows, rock falls, possible mine subsidence, shallow water table, open quarries, floods, and polluted or non-potable water supply shall be identified in all applications, and development shall not be permitted in these areas unless the application provides for the avoidance of the particular hazards ~~If avoidance is impossible or would require the construction to violate other development standards, then such hazards shall be minimized or mitigated.~~ Land

subject to severe ~~wind and~~ water erosion shall be identified on all plans and shall not be subdivided. ~~unless the problems are mitigated by density limitation or some other practical method.~~

#### 5.5.2 Slope Conditions

**p132** C) Restoration of Disturbed Areas: add If re-vegetation is unsuccessful, planting will be repeated until more than 80% of the ground surface is covered in live vegetation.

5.6 Stormwater Drainage Control. This section will be extensively modified by the new Town of Silver City Water Harvesting Ordinance when it is written.

#### 5.6.1 Purpose and Intent.

A) To treat stormwater as a valuable resource and to prohibit the concentration and/or disposal of stormwater directly into the natural drainage system.

Note: Change the letters in the remaining sections.

~~A) B)~~

**p133** ~~B~~ C) As to flood control, to prevent the loss or injury to human life, to minimize flood damages to public and private property, and to provide for timely and effective construction and maintenance of flood control facilities, and water harvesting works.

~~E) D)~~ As to storm drainage, to prevent the creation of public safety hazards and seek to eliminate existing problems, to prevent to the extent feasible the discharge of storm runoff from public facilities onto private property, if there is no drainage easement or if the landowner does not want this water, prevent the increased risk of flood damage to private property caused by storm runoff from other private property and to provide for timely and effective construction of water harvesting storm drainage facilities.

~~D) E)~~

**p134** 5.6.3 General Provisions.

A) The Town is and shall remain an active participant in the National Flood Insurance Program. The Town endorses the program goal of flood damage reduction through the prohibition regulation of development within flood hazard areas, ~~and the preservation and~~ enhancement of floodways, and the construction of water harvesting features and watershed restoration that will diminish flood damage in a responsible and pro-active way. This Section is intended to complement and supplement the Floodplain Overlay District regulations and shall be administered in concert with them.

B) All land within the Town shall be developed with provisions for adequate drainage, flood control, water harvesting, and erosion control facilities . . . .<keep remainder of section>

**p135** H) Subdivisions shall be designed to optimize water harvesting within the urban landform. ~~minimize sheet flow from one lot to another~~

**p135** 5.6.4 Surface of Water Harvesting from Streets for Drainage and Flood Control Purposes

A) Water Harvesting shall be the primary means for managing street runoff. If this is not practical along certain blocks, the surface of streets may be used for drainage and flood control purposes, to the extent such use does not interfere with the safe transportation of people and vehicles. The primary use of streets shall be for conveyance of motorized and non-motorized travel.

C) The discharge of nuisance waters to public streets shall be prohibited ~~discouraged~~. Streets shall be protected from ~~flood~~ storm water runoff damages to the pavement and from safety hazards such as the deposition of sediment created by surface flow of nuisance waters across them.

**p135** 5.6.5 Water Crossings

D) Channel crossing structures which access new developments including temporary crossings, shall be constructed at developer expense. Crossings will be designed to protect the present grade of the channel from down cutting, will not adversely alter the channel alignment, and will have sufficient capacity so as not to increase the velocity of flow during a 10 year runoff event.

5.6.6 Channels

**p136** A) The Town seeks to preserve pre-development drainage patterns, and to improve the ecological condition of these waterways to the extent possible. The use of natural channels as the overflow path for water harvesting earthworks for drainage is encouraged. ~~Concentrated~~ Natural drainage flows shall enter and depart from a developed area in the same manner and location as pre-development conditions. No development shall be constructed in such a way as to increase discharge to the natural waterways during the two year storm.

5.6.7 Financial Responsibility

B) All water harvesting drainage, and flood control facilities which directly result from proposed land use change are the responsibility of the developer. Developer financed facilities include all those within the boundaries of the development, those required for development adjacent to a major arroyo or within a flood hazard area, and all temporary and permanent off-site drainage facilities. If the construction of such facilities is a condition of plat approval or building permit issuance, the financial guarantees of such construction satisfactory to the town engineer shall also be provided as a prerequisite.

**p137** 5.7 Public Utilities

5.7.2 <keep original language and add> All subdivisions and all new residential and commercial construction shall have a greywater system dedicated to irrigation of landscaping, with a conveniently located "Y" valve installed to shunt this water to the sewer system when necessary.

5.9.5 Parking Layout and Design

A) Parking Area Dimensions

**p149** 6) Parking areas ~~should~~ shall be designed to provide adequate aisle widths between rows of parked cars, and provide adequate space for water harvesting tree basins, so that the parking stops prevent injury to the trees. Parking areas are required to have one water

harvesting tree basin for every four parking spaces. One tree shall be planted in each basin. If this tree dies or is injured so that it will not attain a height tall enough to provide adequate shade for the parked vehicles, it shall be replaced at the expense of the parking lot owner.

**P150 5.10.4** Parking Lot Landscaping.

<add at end> Parking lots shall be designed to drain entirely to tree basins and other landscaping areas so that there is no runoff from the two year storm.

**p151 5.10.6** Required Landscaping Materials and Practices

A) 1) At lease one low-water-use tree or other woody plant which is six feet or more in height. This vegetation must either be native to the Gila National Forest or food producing. Specifically prohibited are Tamarisk, Russian Olive, Tree of Heaven and Siberian Elm.

2) At least two shrubs, cacti, perennial flowers, or other herbaceous or woody plants of two to six feet in height when mature. This vegetation must either be native to the Gila National Forest or food producing.

C) Deprivation Standards.

**p194** 5) The extent to which the regulations protect users or neighbors from threats to health or safety shall be fully accounted. A use that seriously threatens the safety or health of future residents or neighbors, or that would constitute a nuisance at common law, is not a beneficial use. This would include attempting to build below base level.

**p194** Granting Relief

1) b) The potential for damage to either residents or property or water quality on or nearby or downstream of the site in question shall be assessed in determining a beneficial use. Conditions shall be placed on sites where damage from building or hazardous circumstances is likely to occur. The conditions may include location restrictions, size limitation, construction practices and shall require a building to be built so it will not be damaged and so that it will not damage other property.

**References:**

Rainwater Harvesting for Drylands, by Brad Lancaster, Rainsource Press, 2006

Tucson Ordinance #10597 "Rainwater Harvesting"

U.S. E.P.A. Statement of Procedures on Floodplain Management and Wetlands Protection, Jan 5, 1979