

Running Head: DEVELOPING A WILDLAND URBAN INTERFACE FIRE PLAN

Learning from the Past: Creating a Wildland Urban Interface Pre-Fire Plan
for the Aliso and Wood Canyon Area.

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Abstract

The problem was the City of Laguna Beach has the potential to be significantly impacted by wildland fires and the Laguna Beach Fire Department did not have a pre-fire plan for the Aliso and Wood Canyon wildland urban interface area. The purpose of this research project was to develop a pre-fire plan for the Aliso and Wood Canyon wildland urban interface area. The following research questions were answered. Will the Laguna Beach Fire Department and mutual aid resources benefit from having a wildland urban interface pre-fire plan? Have other organizations benefitted from having a wildland urban interface pre-fire plan? What information should be included in a wildland urban interface pre-fire plan? How will the data be gathered, formatted, and displayed for the Aliso and Wood Canyon pre-fire plan? How shall the pre-fire plan be verified and implemented? The research indicated that the Laguna Beach Fire Department and mutual aid resources will benefit from having a wildland urban interface pre-fire plan for Aliso and Wood Canyons. The research also shows that organizations have benefitted from the use of pre-fire plans at wildland urban interface fires. The research identified what information should be included in a wildland urban interface pre-fire plan and how such data should be collected, formatted, displayed, verified, and implemented. Recommendations for institutionalizing the pre-fire plan by including it in training exercises and promotional exams as well as options for further refinement are made. Concepts for additional topic categories and further research are offered. This action research project produced a wildland urban interface pre-fire plan for the Aliso and Wood Canyon Wildland Urban Interface area.

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Learning from the Past: Creating a Wildland Urban Interface Pre-Fire Plan for the Aliso and Wood Canyon Area.

The problem is the City of Laguna Beach has the potential to be significantly impacted by wildland fires and the Laguna Beach Fire Department does not have a pre-fire plan for the Aliso and Wood Canyon Wildland Urban Interface area. The purpose of this research project is to develop a pre-fire plan for the Aliso and Wood Canyon Wildland Urban Interface area. This will be an action research project involving a comprehensive review of available literature and identification of resources available to the Laguna Beach Fire Department. A survey of other departments that utilize Wildland Urban Interface (WUI) pre-fire plans will be conducted to determine their usefulness on actual WUI fire incidents and to analyze what information is being gathered and displayed on other organization's pre-fire plans. The following research questions will be answered: Will the Laguna Beach Fire Department and mutual aid resources benefit from having a Wildland Urban Interface pre-fire plan? Have other organizations benefitted from having a Wildland Urban Interface pre-fire plan? What information should be included in wildland urban interface pre-fire plans? How will the data be gathered, formatted, and displayed for the Aliso and Wood Canyon pre-fire plan? How should the pre-fire plan be verified and implemented? This action research project will produce a wildland urban interface pre-fire plan for the Aliso and Wood Canyon area.

Background and Significance

The City of Laguna Beach is a 9.1 square mile community on the Southern California Coast with a resident population of 23,727 that swells upward of 100,000 during peak tourism periods. Known for having a rich tradition in art while possessing some of the most picturesque beaches and open space in the world; Laguna Beach attracts approximately 3 million visitors per year (City of Laguna Beach [CLB], 2006). Thousands of acres of dedicated open space and park

land surround the northern and eastern boundaries of the city and provide a rustic backdrop to the quaint seaside village. Laguna Beach is an affluent community with a median household income of \$122,966 and an average median home price of \$1,889,154 (Cable News Network, 2007).

The Laguna Beach Fire Department (LBFD) is divided into two divisions consisting of Operations and Fire Prevention. A fire chief, three chief officers, and one administrative assistant manage the department and provide chief officer coverage for emergency incidents. The Laguna Beach Fire Department staffs four stations with 12 on-duty firefighters and employs 40 sworn and 3 non-sworn personnel. Each station houses a Type 1 Engine which is staffed with a Captain, Engineer, and Firefighter. Stations one and four are paramedic engines providing ALS level care and Stations two and three provide BLS level care. The Laguna Beach Fire Department also cross staffs a city purchased Type 3 Wildland Engine and a Type 1 Engine from the Governor's Office of Emergency Services (OES). LBFD has strong mutual aid and automatic aid agreements which assist with providing services. Services provided include: EMS, fire suppression, rescue, Haz-Mat, fire prevention, and public education. In 2007 2,569 calls for service were answered as follows: 1,499 EMS, 45 fires, 148 other rescues, 102 Haz-Mat, 164 service calls, 423 false alarms and good intent, and 188 other calls and incidents.

The Wildland Urban Interface or WUI is described as that area where structures are dispersed through or near undeveloped wildland (Murnane, 2006). The City of Laguna Beach has approximately 1,800 homes that are directly adjacent the WUI (City of Laguna Beach [CLB], 2007). Thousands of homes are located directly inside the interface fringe and make up a continuous fuel bed of approximately 12,000 homes that terminates at the Pacific Ocean. On October 27, 1993 Laguna Beach experienced a devastating wildfire that consumed 363 homes and burned 14,437 acres before the Santa Ana winds subsided and the remaining fire could be

extinguished. The incident is still considered California's 9th most devastating fire for total structures lost at 441 (Cal Fire, 2007).

During the period from 1984 to 2007 Laguna Beach has experienced many vegetation fires ranging in size from 10 acres to 14,437 acres. Most of these fires have occurred in the Laguna Canyon Fire Corridor along Laguna Canyon Road which is the only east/west entrance into the City. The 1993 Laguna Fire also occurred in this fire corridor and represented a total insured loss of \$350,000,000 (Insurance Information Institute, 2004). Ironically, the fire corridor formed by the Aliso and Wood Canyon has never experienced a significant recorded fire. Aliso and Wood Canyon is designated as a wilderness area accessible only by hikers, horseback riders, and mountain bikers. Thus, the lack of exposure to large populations or vehicles is likely the primary contributing factor for not having a significant fire history. However, fire simulation runs using Behave computer modeling indicate that extreme fire conditions can be expected in the Aliso and Wood Canyon area especially during fall weather patterns (City of Laguna Beach [CLB], 2005). Approximately 3680 Laguna Beach homes are within the Aliso and Wood Canyon WUI threat area.

If one understands that fire history repeats itself then it is logical to anticipate future fires will occur in the fire corridors adjacent and surrounding Laguna Beach. Gordon Graham, a well known speaker and author of risk management practices, proclaims that "if an event is predictable, then it is preventable" (Graham, 2006). Fire professionals can predict fire behavior and areas prone to fire, but they also know that not all fires can be prevented. Thus Graham's paradigm suggests that advanced planning for future fires can and should be done by those communities likely to be affected by such an event.

The National Fire Academy's Executive Analysis of Fire Service Operations in Emergency Management Course encourages managers to identify innovative ways to improve

emergency operations and support the United States Fire Administration's mission by helping to: identify opportunities to reduce life or economic loss due to fires, reduce the potential of life loss for firefighters from fire, and responding to this emerging issue in a timely manner (Federal Emergency Management Agency [FEMA], 2005). It will be the responsibility of L.B.F.D. staff to analyze the data collected and act on areas within their scope of management. It will also be the responsibility of L.B.F.D. staff to provide the report to the City Manager for review. It is hoped that the City Manager will forward the information to policy makers so that they may consider acting on opportunities to support the mission of reducing loss of life and property.

Literature Review

The WUI problem has been a difficult challenge for fire departments since the early 1900's (National Wildfire Coordinating Group [NWCG], 2008). The problem has been exacerbated by two simultaneous occurrences: a growing population coupled with the ensuing urban sprawl and people's desire to develop in previously undeveloped countryside to experience a more rural setting. Rhode (2002) confirms urban sprawl as the primary human cultural factor responsible for the increase in WUI fires. This situation continues to expand the WUI fringe and increases the number of the intermixed structures within rural areas. The City of Laguna Beach is built out with no likelihood of development within the adjacent designated wilderness areas. Thus the WUI problem for Laguna Beach is mostly static and fairly well defined.

Will the Laguna Beach Fire Department and Mutual Aid Resources Benefit From Having a Wildland Urban Interface Pre-Fire Plan?

The basic components of emergency preparedness "involves the functional, logistical, and operational elements of emergency management" (Schwab, Eschelbach, and Brower, 2007, p. 22). Fire professionals have known for years that pre-fire planning for potentially significant or unusual incidents is a fire service best practice. At its basic core the purpose of emergency

planning is to reduce risk to human lives and more specifically to reduce the need to improvise by providing decisions where appropriate prior to the event (Alexander, 2002, p. 4). Pre-incident plans should “assist fire officers in establishing priorities and making fireground decisions” (National Institute for Occupational Safety and Health [NIOSH], 2005, p. 10).

In order for a pre-incident plan to be valuable it should contain enough detail to be useful to fire officers without attempting to anticipate every possible scenario. Pre-incident plans should not get bogged down by attempting to anticipate every possible nuance of a disaster because they can become unwieldy when this approach is taken. They should instead concentrate on cataloguing useful information that can be readily accessed during an emergency (Teie, 1997, p. 402). The National Fire Protection Association (NFPA) states that “written preparedness plans for wildland fire control shall be based on life safety, followed by resource /property values to be protected, as well as the political, social, economic, environmental, and other concerns of the local jurisdictions” (NFPA 1143, 2003, p. 7). This information is currently lacking in any organized, single resource format for the Aliso and Wood Canyon area.

A NIOSH (2005, p. 1) investigation for a firefighter fatality at a WUI fire recommended that “fire departments and fire service agencies should ensure that, at a minimum, high-risk geographic areas are identified (e.g.; topography, fuels, property, etc.) as part of the pre-planning process and that information is provided to assigned crews.” A WUI pre-fire plan can serve to fill the information gap that occurs (particularly in the initial attack phase) when mutual aid units arrive in Aliso and Wood Canyon and its surrounding WUI fringe to protect structures or fight fire in territory they are not familiar with. First arriving units typically find themselves lacking the appropriate information that assists with making operational decisions; a situation that can place firefighters at greater risk to injury or death. The Aliso and Wood Canyon WUI pre-fire

plan will provide many of the components of the 10 Standard Firefighting Orders and 18 Watchout Situations (USDA, 2008) that are often missing during initial attack operations.

Initial attack and extended attack resources benefit from having the pre-incident plan information by improving civilian and firefighter safety, better utilizing resources, and understanding the scope and potential of the fire problem and its effects on socio, economic, and political factors. Teie (1997) suggests that the process of developing a plan is more important than the plan itself because valuable relationships with cooperating agencies are established or maintained. Thus it is anticipated that collaboration among the Laguna Beach Fire Department with assisting and cooperating agencies will serve to strengthen relationships and comfort levels with the Aliso and Wood Canyon WUI pre-fire plan.

Have other organizations benefitted from having a Wildland Urban Interface Pre-Fire Plan?

After an extensive search of the National Fire Academy's Learning Resource Center it was determined that very little published literature exists that exemplifies the benefits of WUI pre-incident planning at specific incidents. However, data does exist that suggests that the lack of pre-fire planning can be a contributing factor to firefighter deaths and injuries (NIOSH, 2005; Thirtymile Accident Review Board, 2002; USFA, 1991). Literature was also found which supports the notion that pre-fire planning for significant risks is a moral and legal responsibility (Alexander, 2002, p. 5). Thus the literature implies that all organizations with a WUI problem will benefit from developing a pre-fire plan.

The United States Fire Administration's (USFA) technical study of the East Bay Hills Fire (Oakland-Berkeley, CA) stated "it is unrealistic to expect normal emergency response systems that are based on routine demands to smoothly manage a disaster situation; the test is how quickly and effectively a disaster response system can be implemented" (p. 97). The report goes on to state "it is impossible to manage a large scale disaster with insufficient command

personnel and inadequate command and control systems. Fire Departments should always anticipate “worst case” scenarios and develop plans and procedures to address those situations” (USFA, 2001, p. 98). Fire service professionals agree that pre-incident planning can improve emergency response capabilities to large scale disasters. During interviews with fire command subject matter experts, Rhode (2002) found universal agreement that detailed pre-incident fire plans are the key to achieving success at catastrophic WUI fires citing “that many actions can be preplanned, relieving Incident Commanders and other staff from expending “mental energy” on these efforts ad hoc” (p. 196).

What Information Should be Included in Wildland Urban Interface Pre-Fire Plans?

Opinions vary widely on what information should be included in a WUI pre-incident fire plan. Teie (1997) suggests that the plan should be “helpful rather than instructional” and based on what “people will likely do versus what they should be doing” (p. 402). Thus a pre-incident fire plan should provide enough information to allow firefighters to make informed decisions and flexible enough to adapt to the dynamic conditions of a WUI fire incident. Another consideration for determining what should be included in a pre-fire plan is the Incident Command functional levels intended to use the plan. A Strike Team Leader assigned to structure protection in a small geographic area needs specific information pertinent to his or her assignment. Conversely, an Operations Section Chief should have a broader and more generalized view of the entire fire problem.

In order to meet the needs of all functional levels within the Incident Command System (ICS) the pre-incident fire plan should be detailed enough to be useful at the lowest functional levels and robust enough to provide the Command and General Staff with sufficient information to be an effective planning tool. A modular pre-fire plan is the best approach to accomplish this goal which is similar to the concept that an ICS structure is only expanded to meet the needs to

effectively manage the incident. Alexander (2002) supports this concept by suggesting there should be a body of the plan that contains the basic elements of the overall plan and further technical detail should be included in technical annexes or appendices (p. 101).

NIOSH (2005) suggests that the lowest functional levels operating at a WUI fire should have the following minimum information: “maps showing topography, possible staging areas, target hazards, access routes, water sources, and possible facilities such as base camps, helibases, and helispots; special considerations such as special hazards, fuels, expected fire behavior, etc.; and lastly the history of previous fires” (p. 10).

Conversely, Rhode (2002) suggests that a WUI pre-incident fire plan should contain the following:

detailed and specific strategic and tactical guidelines and targets, resource needs, projected fire behavior and growth, evacuation and life safety needs, structural and other values at risk, and how to implement selected elements of the Incident Command System, including command, operations, firefighter safety, basic planning and logistics, evacuation and life safety, law enforcement coordination, resource deployment plans, incident planning, and logistical support (p. 196).

NFPA 1143 (2003) provides a recommended framework for WUI pre-fire plans as follows:

Identification of specific wildland fire hazards and risks and hazard areas within the jurisdiction and other hazards that negatively affect wildland fire control efforts; Identification of fire protection features such as lakes, rivers, water points, natural firebreaks, and other areas or features that are beneficial to wildland fire control efforts; a list of resources including personnel, apparatus, and equipment; a list of cooperating agencies and other mutual aid resources and the procedures

for requesting assistance from those agencies and resources; a reference to any and all mutual aid agreements, contracts, and other protection agreements applicable to wildland fire control efforts; a list of specific objectives relating to training, safety, response times, and staffing levels; a list of other resources that provide analyses of fire cause, identification of special fire hazards and risks, assessment of wildland/urban interface and intermix fire protection problems, and proposed measures to reduce fire occurrence.

Clearly there is a difference in the amount of information that is suggested for inclusion in a WUI pre-fire plan and the needs for various functional levels within the incident command structure dictate the amount of information needed. Thus the WUI pre-fire plan should have an adequate amount of information to be a benefit to incident commanders and modular so that the lowest functional levels such as strike team leaders and engine/crew bosses are provided with only the information they need. Natural areas for the creation of a modular WUI pre-fire plan can be based on pre-defined geographic and functional needs at the branch, division, and group levels.

How Shall the Data be Gathered, Formatted, and Displayed for the Aliso and Wood Canyon Pre-Fire Plan?

Pre-fire planning is typically conducted at the company level for many different reasons. Pre-fire planning conducted at the lowest functional level places those individuals that will be conducting high-risk firefighting operations at the site during non-stressful and optimal conditions. The familiarity that is developed during the pre-planning process can enhance firefighter safety and fire ground effectiveness. Thus it would not serve the same purpose if civilians or staff personnel conducted pre-incident planning. However, difficult or challenging pre-plans may require chief officer or subject matter expert support. Finally, the relationships

built with responsible parties during a pre-plan visit are useful for gathering site specific information, developing support for fire prevention initiatives, and educating responsible parties.

This philosophy can be applied to the fire component of a WUI pre-fire plan as being best conducted at the company level. Personnel at the company level should have wildland firefighting and WUI structure protection experience and support from specialized staff personnel (GIS Specialist, Wildland Defense Coordinator, etc.) and Chief Officers. This is due to the large scale of the plan and the decisions that must be factored into the plan such as the determination of where initial resources will be deployed based on firefighter safety and where they are likely be most effective.

A standard format and display for WUI pre-incident fire plans already exists within Orange County. Several WUI pre-incident plans have been developed with the Orange County Fire Authority taking the lead in all cases. The Orange County Fire Authority and the Laguna Beach Fire Department have agreed to work collaboratively on the Aliso and Wood Canyon Pre-Fire Plan. During a meeting on February, 20th, 2008, key members of both organizations met to discuss the plan's format, display, and how the work would be divided. The WUI pre-fire plan template already being utilized in other areas of Orange County was chosen as the starting point for the project. NIOSH (2005) and Rhode (2002) suggest that WUI pre-fire plan information should at least be displayed in map form. The Orange County template contains a large map of the entire WUI problem with smaller maps broken down into structure protection branches. The maps suggest resource needs and deployment for worst case scenarios as well as identification of: target hazards, infrastructure, hydrants, access routes, staging areas, ICP locations, helibases and helispots, base camps, geographical features, and hazard ratings.

How Should the Pre-Fire Plan be Verified and Implemented?

Experts agree that an emergency preparedness plan of any type should be trained on and verified for validity. (Alexander, 2002) states that emergency plan development is an on-going process and should not be considered a finished product but rather a document that can be changed when new “expertise or experience” warrants modifications (p. 130). NFPA 1143 (2003) recommends that pre-fire incident plans be reviewed at least annually.

There are several methods to verify and implement a pre-fire incident plan. Verification and implementation can be obtained through individual review and feed back of all participating agencies and groups. The feedback can be incorporated into the plan if appropriate and the final draft can be distributed for use. This method lacks the rich feedback that collaborative meetings provide and the project can loose priority when competing with busy schedules. Another option is to gather role players from cooperating agencies that will likely participate in an actual incident and review the pre-fire plan in a group setting. This method is preferred over the first option because valuable group input is obtained but the functionality of the plan may still be in question. Yet another option is a variation of the previous exercise that includes a table top simulation which actually exercises the drill in a Field Operations Center or Incident Command Post type setting. This method is often the preferred option because it is not as resource intensive as a full-scale drill but it does exercise the plan to a certain extent. Finally, the plan can be exercised during a full scale drill that includes the mobilization of resources. This method of verifying a pre-fire plan is most effective and beneficial to participants but is also the most labor intensive. Alexander, (2002, p. 131) explains that it usually takes a major field exercise or an actual emergency to determine the effectiveness of a plan. Schwab, Eschelbach & Brower (2007) also support this opinion by stating that preparedness “capabilities can only come about through planning, training, and performing emergency exercises ahead of the disaster” (p. 378).

An important consideration is that the planning for an exercise of this magnitude can be as much work as developing the pre-fire plan.

After exercising the plan participants should share their opinions during a debriefing session and detailed notes should be taken to modify the plan as necessary (Alexander, 2002, p. 130). Once the plan has been verified and revised it should be distributed in final draft form to all cooperating agencies. Actual incidents where the plan is employed should provide invaluable feedback that can serve to further validate and update the plan.

Finally, the pre-fire plan should be considered a living document and should not be placed on a shelf and forgotten. Recommendations from the Thirtymile Fire (Thirtymile Accident Review Board, 2002) and the Cedar Fire (NIOSH, 2005), both firefighter fatality fires, suggest that pre-fire plans be reviewed by cooperating agencies and updated at least annually. To further illustrate this point (Schwab, Eschelbach, & Brower, 2007) state that emergency responders and managers are always in a preparation and mitigation mode until disaster strikes and emergency personnel begin the response mode.

The literature review provided insight on the value of developing a WUI pre-fire plan and illustrated how communities, fire departments, and mutual aid personnel may benefit when such a plan is implemented. Specifically, the literature identified how WUI pre-fire plans can increase firefighter safety and enhance command and control capabilities. The literature review also identified the information that should be included in a WUI pre-fire plan and provided suggestions for how the information should be gathered, formatted, and displayed. Finally, the literature review provided options for verifying and implementing a pre-fire plan as well as suggestions for periodically updating the plan.

Procedures

This research project was first conceptualized by the author while attending the National Fire Academy's Executive Analysis of Fire Service Operations in Emergency Management course during the winter of 2008. While on the campus a topic search at the Learning Resources Center (LRC) revealed that there was sufficient information to support the development of a WUI pre-fire plan for the Aliso and Wood Canyons. The author proposed the research topic, problem and purpose statements, and research questions to the evaluator and received feedback and approval to proceed with the project.

The author attempted to contact 19 fire agencies which resulted in phone interviews with representatives from 15 California fire departments with similar WUI problems as the Laguna Beach Fire Department. Information was collected and entered into a data collection tool (Appendix A) which also served to organize the interviews. The following jurisdictions were chosen due to their similar vegetation, topographical, and climatic conditions: (Orange County) Anaheim, Brea, Orange, Orange County Fire Authority; (Los Angeles County) Los Angeles City, Los Angeles County, Burbank; (Riverside County) Riverside City, Riverside County; (San Diego County) San Diego City, Lakeside Fire Protection District, North County Fire Protection District, Rancho Santa Fe Fire Protection District; (Santa Barbara County) Santa Barbara City, Santa Barbara County, Carpenteria/Summerland Fire Protection District; (Ventura County) Ventura City, Ventura County; (Kern County) Kern County. The phone surveys were conducted June 9th through the 27th, 2008, and lasted approximately 30 to 60 minutes each. The author allowed interviewees to stray outside the structured survey when their personal experiences and comments added to the overall depth and quality of the information collected. The author directs readers to Appendix A for information regarding contact names and agency specific information that was gathered.

The first question asked is “will the Laguna Beach Fire Department and mutual aid resources benefit from having a wildland urban interface pre-fire plan?” The City of Laguna Beach shares many similar characteristics with the surveyed jurisdictions possessing WUI pre-fire plans. Thus it may be inferred that the Laguna Beach Fire Department and mutual aid resources are currently at a disadvantage without a WUI pre-fire plan and this notion supports the problem statement. This question also intended to address the purpose statement by confirming through phone interviews that other jurisdictions benefit from WUI pre-fire plans implying that the Laguna Beach Fire Department and mutual aid resources could also benefit from having a WUI pre-fire plan for Aliso and Wood Canyon.

The second question asked is “have other organizations benefitted from having a wildland urban interface pre-fire plan? This question addresses the problem and purpose statements by implying that if other organizations benefit from having a WUI pre-fire plan then so can the Laguna Beach Fire Department. This question could not be sufficiently answered through literature review due to the lack of specific documentation on the subject. The author intended to generate new data that supports the assumption that organizations have benefitted from having a WUI pre-fire plan during wildland urban interface fires.

The third question is “what information should be included in wildland urban interface pre-fire plans? This question intended to address the problem and purpose statements by demonstrating through phone interviews that the Laguna Beach Fire Department will benefit from having a complete and robust WUI pre-fire plan for Aliso and Wood Canyon. The interviews were rich in data explaining the various components of the surveyed fire department’s WUI pre-fire plans. One limitation of this question is that every jurisdiction’s WUI fire problem and organizational needs will create variations among WUI pre-fire plans.

The fourth question is “how shall the data be gathered, formatted, and displayed for the Aliso and Wood Canyon pre-fire plan? This question intended to address the problem and purpose statements by demonstrating through phone interviews that the Laguna Beach Fire Department will benefit from the process of collecting the data for the Aliso and Wood Canyon pre-fire plan. This question also supports the problem and purpose statement by identifying the most effective way to format and display WUI pre-fire plan information. The interviews provided adequate information on pre-fire plan data gathering, formatting, and displaying. One limitation of this survey question is that each organization has specific policies on how their WUI pre-fire plan information is gathered, formatted, and displayed to meet their organizational needs and capabilities.

The fifth question is “how should the pre-fire plan be verified and implemented? This question is intended to support the problem and purpose statements by identifying through phone interviews the various methods to implement and verify a WUI pre-fire plan. The interviews provided sufficient data to identify methods for verification and implementation of WUI pre-fire plans. One limitation of this research question is that the literature review and interviews will not provide agency specific information regarding the best verification and implementation option for the Laguna Beach Fire Department.

Limitations

Limitation number one of the research questions is that no information is expected to be found that is specific to Laguna Beach. The research is designed to provide sufficient relevant data for the author to develop a WUI pre-fire plan for the Aliso and Wood Canyon area. This approach requires a synthesis of the data and development of the Aliso Wood Canyon WUI pre-fire plan will be based on the author’s interpretation of research information gathered and personal experience.

Limitation number two of the research method is that the interview results are limited to 15 fire departments. All 15 fire departments have significant WUI fire problems which are similar in many ways to the City of Laguna Beach. A larger pool could have been chosen but the author chose to conduct phone interviews to obtain rich data. One consequence of this method of data collection is the amount of time necessary to conduct a thorough interview. A larger interview pool was outside the limitations that the author placed on the research project.

Limitation number three of the research project is that public library database searches produced little supporting information. While sufficient data was collected from the National Fire Academy's (NFA) Learning Resource Center (LRC) it was the only library data base successfully utilized by the author to identify pertinent research material. The utilization of additional library databases was performed by the author but they lacked in comparison to the depth of fire service related material that the NFA's LRC possesses.

Assumptions

Assumption number one of this research project is the 19 fire departments chosen by the author are representative of the Laguna Beach Fire Department's WUI fire problem. Each fire department is known throughout the firefighting community as having a WUI fire problem but many other departments that are not included in the survey also have WUI problems.

Assumption number two is the information gathered during the phone interviews was obtained from people with sufficient knowledge and experience regarding their WUI pre-fire plan. In most cases the author was successful in locating and interviewing a resident expert at each of the 15 agencies with a WUI pre-fire plan.

Assumption number three presumes the author will successfully eliminate all subjectivity from participants during the collection of the interview data. The research method also assumes that the author will objectively interpret the data collected.

Results

The results of the research conducted for this project provided the background to produce a wildland urban interface pre-fire plan for the Aliso and Wood Canyon area (see Appendix B). The project utilized feedback obtained from fire professionals during phone interviews and information gathered from an extensive literature review. Field reconnaissance was conducted by Laguna Beach Fire Department personnel to gather the necessary information identified in the literature review and phone interviews. The GIS Section of the City of Laguna Beach received the field data and created maps for the Aliso and Wood Canyon pre-fire plan. The final product was implemented after an extensive review by the Laguna Beach Fire Department and the Orange County Fire Authority.

How Will the Laguna Beach Fire Department and Mutual Aid Resources Benefit From Having a Wildland Urban Interface Pre-Fire Plan?

Questions 1, 18, 19, and 20 of the interview answered this research question. Question 1 asked each agency if they have a WUI pre-fire plan? 60% (9) of the agencies interviewed have developed WUI pre-fire plans for their jurisdictions. 83% (5) of the agencies interviewed that did not have a WUI pre-fire plan stated that they desired such a plan or were in the process of developing a plan.

Question 18 asked if the agency conducted WUI pre-fire plan training. 100% (9) of the agencies that have developed WUI pre-fire plans stated that they have trained with plans.

Question 19 asked each agency if their WUI pre-fire plan has been used on a fire. 89% (8) stated that they have used their WUI pre-fire plan at a fire.

Question 20 asked if the agency found the WUI pre-fire plan to be effective when used at a fire. 100% (8) of the agencies that have utilized their WUI pre-fire plan at a fire found the plan to be effective.

How have other organizations benefitted from having a Wildland Urban Interface Pre-Fire Plan?

Questions 19, and 20 of the survey answered this research question. Question 19 asked each agency if their WUI pre-fire plan has been used on a fire. 89% (8) stated that they have used their WUI pre-fire plan at a fire.

Question 20 asked if the agency found the WUI pre-fire plan to be effective when used at a fire. 100% (8) of the agencies that have utilized their WUI pre-fire plan at a fire found the plan to be effective.

What Information Should be Included in Wildland Urban Interface Pre-Fire Plans?

Questions 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 answered this research question. Question 3 asked if “hazards” were displayed on the WUI pre-fire plan. 100% (9) of the agencies with WUI pre-fire plans responded affirmatively.

Question 4 asked if “objectives and strategy” were displayed on the WUI pre-fire plan. 89% (8) of the agencies with WUI pre-fire plans responded affirmatively.

Question 5 asked if a “risk assessment” is displayed on the WUI pre-fire plan. 89% (8) of the agencies with WUI pre-fire plans responded affirmatively.

Question 7 asked if “water supplies” were displayed on the WUI pre-fire plan. 78% (7) of the agencies with WUI pre-fire plans responded affirmatively.

Question 8 asked if “routes in” are displayed on the WUI pre-fire plan. 78% (7) of the agencies with WUI pre-fire plans responded affirmatively.

Question 9 asked if “evacuation routes” were displayed on the WUI pre-fire plan. 78% (7) of the agencies with WUI pre-fire plans responded affirmatively.

Question 10 asked if “safe zones” were displayed on the WUI pre-fire plan. 100% (9) of the agencies with WUI pre-fire plans responded affirmatively.

Question 11 asked if “resource needs” were displayed on the WUI pre-fire plan. 89% (8) of the agencies with WUI pre-fire plans responded affirmatively.

Question 12 asked if a “communication plan” is displayed on the WUI pre-fire plan. 33% (3) of the agencies with WUI pre-fire plans responded affirmatively.

Question 13 asked if “command post, incident bases, and staging locations” were displayed on the WUI pre-fire plan. 100% (9) of the agencies with WUI pre-fire plans responded affirmatively.

Question 14 asked if “branches and divisions” were displayed on the WUI pre-fire plan. 67% (6) of the agencies with WUI pre-fire plans responded affirmatively.

Question 15 asked if “critical infrastructure” is displayed on the WUI pre-fire plan. 89% (8) of the agencies with WUI pre-fire plans responded affirmatively.

Question 16 asked if “perimeter control options” were displayed on the WUI pre-fire plan. 89% (8) of the agencies with WUI pre-fire plans responded affirmatively.

Question 17 asked what “other factors” were displayed on the WUI pre-fire plan. The following list of items represents the sum of all of the agencies additional information: dozer and crew access points, lookouts, roof material (wood shake), fire history, contacts (schools, water districts, etc.), aerial photos, 1:50,000 and 1:6000 maps with USGS quads, helispots, SPG recommendations, power lines, traffic choke points, traffic control points, and tow truck staging areas.

How Shall the Data be Gathered, Formatted, and Displayed for the Aliso and Wood Canyon Pre-Fire Plan?

Questions 2, 6, and 21 answered this research question. Question 2 asked in what “format is the WUI pre-fire plan information displayed.” 100% (9) of the surveyed agencies

with WUI pre-fire incident plans displayed information in map form. 89% (8) also displayed information in a “document” style format which accompanied the map display.

Question 6 asked what “detail level” do the maps display? 100% (9) of the surveyed agencies with WUI pre-fire plans have maps that display down to the community level. 100% (9) of the surveyed agencies with WUI pre-fire plans have maps that display down to the neighborhood level. 89% (8) of the same agencies utilize maps with detail down to the street and parcel level.

Question 21 asked if there was “organizational acceptance” at the end user level with the data gathering process. 100% (9) of the organizations with WUI pre-fire plans responded affirmatively.

How Shall the Pre-Fire Plan be Verified and Implemented?

Question 18 answered this research question. Question 18 asked if “pre-fire plan training/verification” took place prior to the plan implementation? 100% (9) of those agencies with WUI pre-incident fire plans responded affirmatively.

Discussion

Upon review of the research findings there are many opportunities for the Laguna Beach Fire Department and mutual aid resources to benefit from having a WUI pre-fire plan for Aliso and Wood Canyons. The research indicates that only 60% of the agencies interviewed have implemented WUI pre-fire plans but anecdotally 100% of those agencies with a significant WUI problem and no pre-fire plan stated they desired having such a plan. Subject matter experts and fire service professionals with WUI problems recognize that pre-fire planning is the key to achieving success at catastrophic wildfires because “many actions can be pre-planned, relieving the Incident Commanders and other staff from expending mental energy on these efforts ad hoc” (Rhode, 2002, p. 196). This point is not lost on the interviewed agencies that have a WUI pre-

fire plan; every agency has incorporated the components that Rhode (2002, p. 196) identifies for inclusion in a WUI pre-fire plan.

The WUI pre-fire plan enhances firefighter safety because it equips fire personnel with valuable information that is typically missing during the initial attack phases. A WUI pre-fire plan fills the information void that typically leads to violations of the 10 Standard Firefighting Orders and the 18 Watchout Situations (USDA, 2008). NIOSH (2005, p. 1) strongly recommends that the following minimum information is given to assigned fire crews: topography, fuels, and property. This information was found in 100% of the survey fire department's WUI pre-fire plans. Ultimately the purpose of a WUI pre-fire plan or any other preparedness plan is to reduce risk to human life and reduce the need to improvise by providing as many decisions as possible before an event (Alexander, 2002, p. 4). Finally, NFPA (1143, 2003, p. 7) emphasizes firefighter safety as the number 1 priority for consideration in wildland fire preparedness plans.

Alexander (2002, p. 5) states that authorities having jurisdiction have a moral a legal responsibility to pre-plan for significant risks. A significant amount of literature was also found which indicates that the lack of information typically found in a WUI pre-fire plan was a contributing factor to some firefighter fatality fires (NIOSH, 2005; Thirtymile Accident Review Board, 2002; USFA, 1991). Thus the Laguna Beach Fire Department and mutual aid resources will benefit from a WUI pre-fire plan because firefighter safety will be improved and operational effectiveness will be enhanced.

The survey results demonstrated that other organizations have benefitted from utilizing WUI pre-fire plans during actual incidents. 89% of the surveyed agencies with a WUI pre-fire plan used the plan at a wildland fire and 100% of those agencies found the plans to be useful and effective. Since the author was unable to locate literature that supports or disputes this research

finding the information should be considered new research. The author can also assume that if similar agencies have benefitted from having a WUI pre-fire plan then so can the Laguna Beach Fire Department and mutual aid resources.

A significant amount of literature was found suggesting the amount and type of information that should be included in a WUI pre-fire plan. Opinions on how much information should be included ranged from minimal to extensive. Teie (1997) provides direction when contemplating the design of a WUI pre-fire plan by stating that the plan should be a “catalogue of useful information that can be readily accessed during an emergency.” The research indicates that a pre-fire plan should be useful from the highest to the lowest functional levels of an ICS organizational chart. A modular WUI pre-fire plan could be designed to provide the appropriate amount of information for line firefighters to the incident commander. Alexander (2002, p. 201) supports this opinion by suggesting the body of the plan contain the basic elements and additional technical data should be included in the appendices and annexes. 89% of the surveyed agencies with WUI pre-fire plans follow a modular format by utilizing both maps and documents.

NIOSH (2005, p. 10) suggests the following as the minimum information that should be contained in a WUI pre-fire plan: “maps showing topography, possible staging areas, target hazards, access routes, water sources, and possible facilities such as base camps, helibases, and helispots; special considerations such as special hazards, fuels, expected fire behavior, etc.; and lastly the history of previous fires.” Rhode (2002, p. 196) suggests the following: “detailed and specific strategic and tactical guidelines and targets, resource needs, projected fire behavior and growth, evacuation and life safety needs, structural and other values at risk, and how to implement selected elements of the Incident Command System, including command, operations,

firefighter safety, basic planning and logistics, evacuation and life safety, law enforcement coordination, resource deployment plans, incident planning, and logistical support.”

By combining the NIOSH (2005, p.10) and Rhode (2002, p. 196) recommendations an extensive outline for a WUI pre-fire plan can be developed. The author found that neither NIOSH nor Rhode make a specific reference to a pre-determined communication plan. The author added radio communication to the survey and recommends it for inclusion in a WUI pre-fire plan because difficult and challenging topography will adversely affect radio communications. Only 44% of the surveyed agencies with a WUI pre-fire plan were found to have every component listed in both the NIOSH (2005, p. 10) and Rhode (2002, p. 196) recommendations. 57% of the survey agencies did not incorporate: water supplies, topography maps, communication plan(s), or fire history maps. 29% did not include emergency vehicle routes or evacuation routes. It is very likely that each of the missing components identified above can be located in other sources at each agency. However, this information is not likely to be accessible by mutual aid resources and may even be difficult for home agency personnel to locate during an emergency.

Gathering the data for the Aliso Wood Canyon WUI pre-fire plan was a collaborative effort of the Laguna Beach Fire Department and the Orange County Fire Authority. The process included neighborhood visits by engine company personnel with experience at WUI fires and first-in responsibility for a majority of the identified area. The author was heavily involved with the placement of resources, risk assessment, identification of operational and logistical support features of the plan, collaborating with law enforcement, GIS personnel, and cooperating agencies.

A previously utilized format that has proven to be effective in Orange County was chosen for the Aliso Wood Canyon pre-fire plan. The plan is modular in design and incorporates both

maps and documents for use by various functional levels. The starting point is a map depicting an overview of the entire Aliso Wood Canyon WUI fire problem made at a community/neighborhood scale and indicating branch boundaries. Branch maps are then utilized on a larger scale which identifies individual parcels and streets. The branch maps also identify specific geographical boundaries designed for structure protection groups to operate within. Due to Laguna Beach's long and narrow city boundaries it was necessary to divide the city into 3 branches: North, Central, and South. The WUI pre-fire plan for the North Laguna Branch was previously completed with adjacent agencies and its boundary stops where the Aliso Wood Canyon WUI pre-fire plan begins. The Aliso Wood Canyon WUI pre-fire plan includes the Central and South Branches of Laguna Beach.

All of the information identified as being necessary for inclusion in a complete WUI pre-fire plan can be displayed in map form. Maps are preferred because they are a visual reference of the fire problem and can identify and properly place the components of a WUI pre-fire plan. 100% of the agencies that have a WUI pre-fire plan utilize maps to display the plan's information. Rhode (2002) and NIOSH (2005) also recommend that at a minimum the WUI pre-fire plan is displayed in map form. However, some information may be too detailed to include all of its contents on a map. In these cases the information should be included in document form as an additional component of the plan. 78% of the survey agencies with a WUI pre-fire plan utilize documents to record and display additional information not suitable for inclusion in map form. Alexander (2002, p. 101) also suggests this approach for inclusion of technical data in separate sections of the WUI pre-fire plan.

The literature review identified several different methods for verification and implementation of a WUI pre-fire plan. Each option has distinct advantages and disadvantages with available resources being the primary deciding factor for selecting which verification and

implementation method to use. The literature review identified full scale exercises as the preferred method for implementation (Schwab, Eschelbach & Brower [2007, p. 378] and Alexander [2002, p. 131]). 100% of the surveyed agencies with a WUI pre-fire plan utilized some method to verify and implement their plan. The data collection instrument was not detailed enough in this area to definitively identify which method was used at each agency.

The literature review suggested that the WUI pre-fire plan should be reviewed at least annually or more frequently if new “expertise or experience” suggests a review is prudent (Alexander, 2002, p. 130). NFPA 1143 (2003) also recommends that pre-fire incident plans be reviewed at least annually. 100% of the surveyed agencies with WUI pre-fire plans stated that they have organizational acceptance of the WUI pre-fire plans which includes periodic review of the plans. The data collection instrument was not detailed enough to determine how frequently the WUI pre-fire plan are updated or reviewed. The literature review also suggested that the process of collaborating with mutual aid resources and cooperating agencies to develop, implement, and review a WUI pre-fire plan is at least as valuable as the plan itself (Teie, 1997). The author found that the process of collaboration helped to build existing relationships and develop new ones.

Finally, the research emphasized that the WUI pre-fire plan should be a living document not intended to be placed on a shelf and forgotten. While the information was not officially captured on the collection instrument; interviews confirmed that all of the agencies regularly train on their WUI pre-fire plans. Alexander (2002, p.130); Thirtymile Accident Review Board (2002); NIOSH (2005); and Schwab, Eschelbach, & Brower, (2007) all state that a pre-fire plan should be regularly reviewed. The regular training and exercising of a well designed pre-fire plan builds confidence and acceptance among the plan users. This fact was captured during the

phone interviews; 100% of the agencies with a WUI pre-fire plan indicated that their plans have organizational acceptance.

Recommendations

As a result of this project the Laguna Beach Fire Department now has all of its WUI areas pre-fire planned. The following is a list of items that should be accomplished to improve the plan:

- Develop and Coordinate a multi-agency exercise to include all city departments and incorporate the activation of the Emergency Operations Center.
- Institutionalize the WUI pre-fire plan by incorporating the utilization of the plan into the annual wildland training exercises, simulator training, and promotional exams.
- Revise the pre-fire plan as opportunities for improvement are identified.
- Duplicate WUI pre-fire plan packages for all Laguna Beach fire stations and units.
- Create a cache of WUI pre-fire plan packages for mutual aid resources.
- Develop an abbreviated field version of the pre-fire plan that is suitable for use at the lowest ICS organizational levels (ex. crew boss, engine boss).
- Explore options to include USGS quad maps in the field versions of the pre-fire plan.

There are significant opportunities for additional research on this topic which could benefit the Fire Service. A larger survey sample which includes different geographic, topographic, and climatic conditions could add to the depth of data on this topic. Future surveys could even be expanded beyond the United States to include countries that have similar WUI challenges such as Spain, Greece, and Australia.

Researchers wishing to gather similar data for development of a WUI pre-fire plan may consider incorporating more detail into their survey instrument depending on a particular area of focus. Additional detail can also be found if future research included side-by-side analysis of

completed WUI pre-fire plans. Information that was offered during the interviews indicates that a significant amount of data is available on the lessons learned by agencies that have utilized their WUI pre-fire plans on actual incidents. Several of these agencies indicated that they have revised their WUI pre-fire plan several times as they have gained valuable experience and identified opportunities for improvement.

The six month time frame given for an applied research project of this complexity poses many challenges. Future researchers in this topic area might consider breaking the project into a smaller and more focused study. Examples might include focused research on just the components that make-up the design of a WUI pre-fire plan or perhaps just the implementation and verification of such a plan.

The implementation phase should include a component for all cooperating agencies to practice the WUI pre-fire plan including activation of the Emergency Operations Center (EOC), law enforcement, animal control, Fire Safe Council, school districts, and hospitals. A large scale training exercise such as this would provide valuable feedback for development and future revisions of the WUI pre-fire plan. Coordinating an exercise of this magnitude is worthy of being a research project in itself.

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Appendix A

Laguna Beach Fire Department
Wildland Urban Interface Pre-Fire Plan Survey

13		14		15		16		17							18	
CP/Base/Staging		Branches/Divisions		Infrastructure		Perimeter Control		Other							Pre-Plan Training/Verification	
Yes	No	Yes	No	Yes	No	Yes	No								Yes	No
1			0	1			0								1	
1		1		1		1									1	
1		1		1		1									1	
1			0		0	1		Helicopter LZ's, Google Earth Aerial Photos							1	
1			0	1		1		Dozer and crew access points, lookouts, roof material							1	
1		1		1		1		Choke points, tow trucks							1	
1		1		1		1		Fire Hx, bridges, contacts (schools, water district, etc.),							1	
1		1		1		1									1	
1		1		1		1		Aerial Photo, Fire Hx, 1:50,000 and 1:6000 maps w/USGS quads							1	

ALISO and WOOD CANYON PRE-FIRE PLAN

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PLAN OVERVIEW

How to Use This Plan

1. Study the text portion of this plan before the fire. Familiarize yourself with potential fire behavior, resource and evacuation issues, water supply, facilities, etc.
2. During an escalating or major incident, consider fire spread and trajectory and select the Branch(s) and/or Groups of the fire plan which are at risk. Activate only threatened areas of the plan.
3. Unify command, resource ordering, and communications between the City of Laguna Beach Fire Department, the Orange County Fire Authority, law enforcement, and other agencies as required. Establish an ICP and Base. Consider ICS Branches for the City of Laguna Beach (North Laguna Branch, Central Laguna Branch, and South Laguna Branch), Aliso Viejo Branch, Dana Point Branch, Laguna Hills Branch, and Laguna Niguel Branch respectively for major fires.
4. Order and deploy resources in accordance with plan recommendations. Recommendations in red in this plan are priority recommendations, blue are second priority recommendations. Order resources as early as possible. Some plan areas may require large amounts of resources. Establish Staging Areas for incoming resources.
5. Utilize the plan recommended strategy, tactics, resources and deployment for the activated Branch(s) and Groups. Distribute Group maps to supervisory personnel as needed.
6. In cooperation with Law Enforcement and Animal Control, identify and initiate required evacuations. Notify the water department(s) to boost pressures and supply. Notify the Red Cross for evacuation support. Notify Southern California Edison San Diego Gas and Electric to manage overhead power lines.
7. As the fire moves from one area to another, be ready to immediately shift resources to emerging risks, and activate additional Branches or Groups from the plan as needed. Retain patrol resources in areas the fire has passed to protect against residual loss.
8. The fire history of the Aliso-Woods Canyon area is very limited and chaparral in this area is typically greater than 100 years old. The plan area has mass volume greater than other chaparral beds of similar age found elsewhere due to coastal influence which makes the sites wetter. There are only two large recorded fires and both were related to military aircraft accidents. The aircraft accidents included the crash of a Sikorsky helicopter near the Ziggurat in the early 1980's burning about 50 acres and the near crash of a fighter jet which jettisoned fuel which ignited in northern Woods Canyon, burning about 600 acres in the late 1970's. There are hardly any fires which exceed 10 acres in size, however many fires have occurred under 5 acres. One fire of 6 acres in the mid 1980's burned two residential roofs off Pacific Island Drive.
9. Critical perimeter control objectives have been planned for each Branch. These objectives may significantly reduce or confine structural loss and should be implemented concurrently with structure protection. These objectives are often historical fire lines which have been successful during previous fires.

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10. For fires threatening the Aliso and Wood Canyon Regional Parks, seek resource protection guidance from representatives from Orange County Parks.

Plan Area

- This plan is to guide response during major wildfire occurrence within the “Aliso and Wood Canyon area,” for the community of Laguna Beach.
- The plan considers a Santa Ana wind driven scenario. While the plan identifies resources, actions, and critical issues for catastrophic fires, lesser incidents may still find the plan useful, but may need to moderate resource requests and evacuations for lesser fire intensity or scale.

Firefighter Safety Concerns

- Potential for extreme fire behavior, especially near the bottom of Wood Canyon at the base of “Top of the World”, the base of the ridge from the top of “Hobo Canyon” to the base of Wood Canyon and Aliso Canyon at the base of “Ceanothus Drive.” Bluebird Canyon and Arch Beach Heights Canyon are interior canyons that also have potential for extreme fire behavior
- Use care not to over commit resources to areas with limited access or safety zones.
- Use caution during public evacuation periods. Limited road access widths may limit vehicle passage. Avoid deployment of fire shelters in roadways if possible.
- Overhead power lines along major ridges and in older residential areas.
- Expect spot fires to develop rapidly and at a significant distance from the main fire. Spots have developed as far as two miles ahead of historical fires.
- Non-irrigated ornamental vegetation around and between homes may mimic natural fuels fire behavior.

FIRE BEHAVIOR FACTORS

Major Fire History

A significant historical fire corridor exists within Laguna Canyon. Fires enter this corridor generally south of the 405 freeway along Highway 133 or the southern extremity of El Toro Road and spread south-westerly under Santa Ana winds. Past fires in the corridor have done extensive structural damage as they approached the coast. As fires bump the coast they spread laterally in both easterly and westerly directions. Dangerous fire trajectory reversals occur at the termination of Santa Ana winds and with the return of onshore gradient winds.

Historical Fire Behavior and Structural Loss

- Laguna Fire: 10/27/93, wind driven, 14,437 acres, 441 homes lost in Laguna Beach and Emerald Bay.
- Boat Canyon Fire: 12/11/79, wind driven, 550 acres, threatening Emerald Bay.
- Laguna Canyon Fire: 1931, wind driven, 1,725 acres, threatening Laguna Beach.

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Successful Actions from Historical Fires

- Early evacuation. The entire City of Laguna Beach was evacuated during the 1993 Laguna Fire which is a significant contributing factor to no civilian fatalities or serious injuries.
- Utilization of limited firefighting resources where success is likely to be achieved.
- Firing operations where appropriate
- Aggressive perimeter control and structure protection operations
- Aircraft when available

Fire Weather Factors Supportive of Large Fire Development

- Threshold for “watch-out” fire behavior: Winds in excess of 12 MPH, relative humidity less than 48%, temperature over 90 degrees, Burning Index over 81. These conditions are met or exceeded in the area approximately 10% of the days/year on a 10 year average, usually in the fall months. (NFDR Area 640)
- Red Flag Warning Criteria: Santa Ana winds in excess of 20MPH, relative humidity less than 15%, Burning Index over 81.
- Under drought conditions without Santa Ana Winds and relative humidity below 35% anticipate extreme fire behavior.

Fuels

- Aliso and Wood Canyon is predominantly comprised of Coastal Sage Scrub Brush (Fuel Model 5), with some Grasslands (Fuel Model 1), and Oak Woodlands (Fuel Model 10).
- No significant fire history is recorded for this area; most fuel beds are over 100 years old.

Potential Fire Behavior

- Flame lengths may be up to 8 feet in grass and up to 100 feet in mature coastal sage scrub brush.
- Winds and then slope will be the predominant spread factors. Small ravines between homes have a history of channeling fire upslope from main front of the fire.
- Expect spotting of as far as two miles ahead under Santa Ana wind conditions.
- Mass structural ignition will increase overall fire intensity and spotting activity. Operations directly under the smoke plume at the head of the fire demands that crews select stands based upon their capabilities and availability of safe refuge.

Risk Assessment Matrix: (RAM)

10 site specific RAM's have been prepared to guide safe deployment during structure protection deployment based upon fire risk factors present in the Central and South Laguna Branch areas. See Appendix “A” for display.

STRATEGY AND TACTICS

General Guidance

- Ensure safety of firefighters and law enforcement officers at all times. Only deploy resources into an area equal to the availability of escape routes / safety zones.
- Implement a firefighting strategy that will provide simultaneous structure protection and perimeter control objectives to limit fire size and trajectory. Pinch the flanks hard to limit the fire's head size at structural impact.
- Resource mobility and bump-and-run tactics are essential for structure protection resources when resource levels are considerably below the requested and anticipated needs. Adequate resources

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should be placed in a patrol status of all potentially affected and previously affected Branches to minimize undetected structural ignitions.

- Utilize the following guidance sheets for each of the pre-identified branches. Activate only those areas needed given fire trajectory and behavior. Use plan guidance and plan maps to direct structure protection, guide ordering, and guide critical perimeter control tactics.
- Initiate concurrent evacuation of threatened human and animal populations. Concentrate on threatened schools and public assemblies.

CENTRAL LAGUNA BRANCH

Structure Protection- Central Laguna Branch

Five potential Structure Protection Groups. Includes areas in the City of Laguna Beach from Park Avenue South to Nyes Place. Very good City maintained fuel modification exists in most areas. Structural ignition risk factor conditions on private property vary from excellent to poor. See maps for deployment locations. **The area along Skyline Drive above Laguna Canyon experienced catastrophic structural loss in the 1993 Laguna Fire. This area is located in the North Laguna Branch.**

Structure Protection Groups (SPG)	Type 1 Engine Strike Teams Needed for Immediate Deployment:	Additional Type 1 Engine Strike Teams Needed for Deployment.
Top of the World SPG (Laguna)	5	2
Temple Hills SPG (Laguna)	1	5
Bluebird Canyon SPG (Laguna)	3	0
Arch Beach Heights SPG (Laguna)	2	6
Balboa/Nyes SPG (Laguna)	5	3
Total 32	16	16

Critical Infrastructure/Target Hazards

- Thurston Middle School, 2100 Park Ave, (949) 497-7785
- Top of the World Elementary School, 21601 Tree Top Lane (949) 497-7790
- Laguna Beach Fire Station 3 (Communications), 2900 Alta Laguna Blvd.
- Alta Laguna Park, 2100 Alta Laguna Blvd.
- Alta Laguna Reservoir, 2300 Alta Laguna Blvd.
- Moulton Meadows Park, Balboa at Del Mar

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Perimeter Control- Central Laguna Branch

Hold fire East of Top of the World, the Fire Road, and Balboa/Nyes. Significant structural loss is likely to occur in the Old Top of the World, Bluebird Canyon, and Arch Beach Heights areas if the fire moves west across control lines. **Consider assigning 1- Type 3 Strike Team, 2- Hand Crews, and 2-Dozers to West Ridge Road and Mathis Trail to construct line and hold the fire north and east. If resources can't be deployed quick enough for an effective/safe operation then consider assigning 1- Type 3 Strike Team, 2- Hand Crew, and 2-Dozers for placement of pre-approved dozer control lines extending from Moulton Meadows Park and proceeding south east to San Simeon in Laguna Niguel. Assign 2-type 3 strike teams, 4 - hand crews, and 3 - dozers to Top of the World, the Fire Road , and Balboa to construct line and hold the fire east of Top of the World, the Fire Road, and Balboa – consider firing operations from the 200' wide fuel modification areas.**

Location/Area:	Engines needed	Hand Crews needed	Dozers Needed
West Ridge Road and Mathis Trail	1 Type 3 Strike Team	2 Hand Crew	2 Dozers
Moulton Meadows Park to San Simeon	1 Type 3 Strike Team	2 Hand Crew	2 Dozers
Top of the World at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	2 Dozers
Fire Road, Balboa, Barracuda, and Bolsana, and Loretta at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	1 Dozers
Nyes at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	0
Totals	5 Type 3 Strike Teams	10 Hand Crews	7 Dozers

Along West Ridge Road and Mathis Trail/Woods Canyon Park: Hold fire north/west of West Ridge Road and north/east of Mathis Canyon Trail. Construct and hold line between Top of the World Park and Aliso Viejo on West Ridge Road. Construct and hold line between West Ridge Road and Wood Canyon Trail on Mathis Canyon Trail.

Top of the World/ City of Laguna Beach: Hold fire east and north of Top of the World. Good to very good fuel modification exists in the interface areas behind Top of the World School west to Alta Laguna Park. Consider firing operations by hand crews assisted by a Type 3 Strike Team. The area South of Top of the World School to the North end of the fire road (Old Top of the World) has good to fair fuel modification, older construction, poor access, significant stands of Eucalyptus, and ornamental vegetation. The potential for extreme fire behavior in Wood Canyon behind Old Top of the World and significant structure involvement is high. Consider constructing line and firing operations if opportunity exists or pre-treat the area with retardant drops. If holding the fire east of the Old Top of the World neighborhood is unsuccessful then consider holding the fire East of Old Top of the World Drive with adequate resources for structure protection and hand crew/helicopter support for spot fires into Bluebird and Rim Rock Canyons. **It is strategically imperative to prevent the fire from moving west of Top of the World and entering the interior canyons such as Bluebird, Rim Rock, and Arch Beach Heights.**

ALISO and WOOD CANYON PRE-FIRE PLAN

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Along the Fire Road, Balboa, Barracuda, Bolsana, and Loretta/City of Laguna Beach: Hold fire east of the Fire Road, Balboa Ave, Barracuda Way, Bolsana Dr, and Loretta Dr. Excellent fuel modification exists between Old Top of the World and Balboa, However, no fuel modification exists from Balboa to Nyes. Consider improving with line construction and or firing operations. Moulton Meadows Park provides a 400' wide green belt to conduct firing operations from. Consider constructing line to improve the minimal fuel modification behind Barracuda Way, Bolsana Dr., and Loretta Dr. to hold the fire. Consider pre-treating the area with retardant drops. **It is strategically imperative to prevent the fire from moving west of the Fire Road and Balboa Dr., Barracuda Way, Bolsana Dr., and Loretta Dr. into entering Upper Arch Beach Heights and interior canyons such as Arch Beach Heights and Hobo.**

Nyes to South Coast Highway/ City of Laguna Beach: Hold fire south of Nyes and east of South Coast Highway. Good fuel modification zones are present in this area, consider line construction, firing, and support with aircraft.

SOUTH LAGUNA BRANCH

Structure Protection- South Laguna Branch

Four potential Structure Protection Groups. Includes areas in Laguna Beach from Nyes Place south to the southern City Limit at Three Arch Bay. See maps for deployment locations. There is no previous recorded fire history in this area and fuel beds are estimated to be 100 years old.

Structure Protection Groups (SPG)	Type 1 Engine Strike Teams Needed for Immediate Deployment:	Additional Type 1 Engine Strike Teams Needed for Deployment.
Wesley SPG (Laguna)	6	1
Ceanothus SPG (Laguna)	4	1
Mar Vista SPG (Laguna)	4	3
Sunset SPG (Laguna)	6	1
Total 26	20	6

Critical Infrastructure/Target Hazards:

- a. St. Catherine's School (Private K-8), 3090 South Coast Hwy, (949) 499-7339
- b. Anneliese Pre-School, 21542 Wesley Dr., (949) 499-5527
- c. Laguna Beach United Methodist Church, 21632 Wesley, (949) 499-3088
- d. Fred Lang Community Center/Park, 21540 Wesley
- e. Vista Aliso Retirement Homes, 21544 Wesley, (949) 499-5581
- f. Aliso Creek Inn and Golf Course, 31106 Coast Hwy., (949) 499-2271
- g. Verizon Switching Station, 31130 Coast Hwy., (XXX) XXX-XXXX
- h. South Coast Water District HQ, 31592 West St., (949) 499-4555
- i. South Coast Medical Center Campus, 31872 Coast Hwy., (949) 499-1311
- j. Laguna Beach Fire Station 4, (Communications), 31646 2nd Ave.

ALISO and WOOD CANYON PRE-FIRE PLAN

City of Laguna Beach Fire Department - Orange County Fire Authority

Perimeter Control- South Laguna Branch

Consider Placement of pre-approved dozer control lines extending from Moulton Meadows Park and proceeding south east to San Simeon Street in Laguna Niguel.

Perimeter control for the South Laguna Branch will typically be at the Wildland Urban Interface fringe. Anticipate extreme fire behavior in Aliso Canyon with no opportunities for placement of personnel or equipment at the flanks or head of a fire in this canyon. Possibility for extreme fire behavior (area ignition) at the West end of Aliso Canyon.

Location/Area:	Engines needed	Handcrews needed	Dozers Needed
West Ridge Road and Mathis Trail	1 Type 3 Strike Team	2 Hand Crew	2 Dozers
Wesley SPG at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	1 Dozer
Ceanothus SPG at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	1 Dozer
Mar Vista SPG at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	1 Dozer
Sunset SPG at WUI Fringe	1 Type 3 Strike Team	2 Hand Crews	1 Dozer
Totals	5 Type 3 Strike Teams	10 Hand Crews	6 Dozers

Wesley SPG WUI Fringe: Hold fire east of structures. Moderate to poor fuel modification in this area, improve with line construction and support with aircraft and potential firing. If fire moves past this control objective, it will likely sweep through the immediate community.

Ceanothus SPG WUI Fringe: Hold fire east of structures. Good to poor fuel modification in this area, improve with line construction and support with aircraft and potential firing. Expect extreme fire behavior (incl. possible area ignition) on the North West side of Ceanothus area as fire travels southwest in Aliso Canyon into this area. If fire moves past this control objective, it will likely sweep through the immediate community.

Mar Vista SPG WUI Fringe: Hold fire east of structures. Poor to non-existent fuel modification in this area, improve with line construction and support with aircraft and potential firing. If fire moves past this control objective, it will sweep through the immediate community.

Sunset SPG WUI Fringe: Hold fire east of structures. Moderate to non-existent fuel modification in this area, improve with line construction and support with aircraft and potential firing. If fire moves past this control objective, it will sweep through the immediate community.

ALISO and WOOD CANYON PRE-FIRE PLAN

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Resource Ordering and Mobility

For fires occurring under worst case conditions, engine needs may outpace resource availability.

Resources may be particularly difficult to obtain during regional fire sieges.

Historical experience would indicate the likelihood of not being able to receive all requested or needed resources until the fire has already completed most of its structural siege. Strategies should depend on deployment of ORC/XOR resources to meet immediate threats. For escaping fires, order significant resources early.

Past fire experience suggests that engine resource order arrival expectations should be;

<i>Following Resource Request:</i>	<i>Number of Type 1 engine Strike Teams Arriving:</i>	<i>Total Strike Teams Onscene:</i>
First Hour	5-8	5-8
Second Hour	4-6	9-14
Third Hour	5-7	14-21

Resource mobility and bump-and-run tactics are essential for structure protection resources when resource levels are considerably below the requested and anticipated needs. Adequate resources should be placed in a patrol status of all potentially affected and previously affected Branches to minimize undetected structural ignitions.

Water Supply

Two water districts serve the area:

Laguna Beach County Water District (Central Laguna Branch) 33,000,000 Gal. Storage Cap.

Hydrants flows are apprx. 3500 GPM with automatic booster pumps operating. Contact Laguna Beach County Water District to deploy personnel and equipment if experiencing water delivery problems.

South Coast Water District (South Laguna Branch) 20,000,000 Gal. Storage Cap.

Hydrant flows are apprx. 1200 – 1500 GPM in most WUI areas. Contact South Coast Water District to deploy personnel and equipment if experiencing water delivery problems.

Laguna Beach County Water District, 306 Third St., (949) 494-1041

South Coast Water District, 31592 West St., (949) 499-4555

Communications Plan

The following communications frequency allocation plan is recommended:

1. Command frequency: 5H
2. Air to Ground frequency (VHF preferred): Assigned by Air Attack
3. Central Laguna Branch: 13F
4. South Laguna Branch: 9H
5. Division A: 5F
6. Division Z: 10F
7. Logistics frequency: 1A

ALISO and WOOD CANYON PRE-FIRE PLAN

City of Laguna Beach Fire Department - Orange County Fire Authority

EMERGENCY EVACUATION

Evacuation Routing

Central Laguna Branch: Laguna Beach Police Department (LBPD) will coordinate and direct civilian evacuation. LBPD will maintain one emergency vehicle ingress route for accessing Top of The World and Arch Beach Heights areas. The preferred emergency ingress route is Park Avenue.

South Laguna Branch: Laguna Beach Police Department will coordinate and direct civilian evacuation. LBPD will provide emergency vehicle ingress routes for the primary use of emergency personnel.

Public Evacuation:

The Laguna Beach Police will direct evacuation. OCSD and CHP will manage traffic control in unincorporated area. Public safety officials will direct evacuees to one of these sites based on safety from fire spread. Red Cross and others will provide operational support of these evacuation centers. The American Red Cross must be notified immediately when an evacuation is considered. Evacuation sites include:

South Evacuation Centers:

LBPD will coordinate the shelter and care of evacuated and displaced residents with American Red Cross.

North Evacuation Centers:

LBPD will coordinate the shelter and care of evacuated and displaced residents with American Red Cross.

Animal Control

LBPD will coordinate and direct the evacuation of domestic animals including: Blue Bell, Fuel Break Management Goats, Animal Shelter, and Marine Mammal Center.

Laguna Beach Animal Control: LB Dispatch (XXX) XXX-XXXX or 5G

Area Schools Requiring Evacuation Consideration

The Laguna Beach Unified School District Serves the City of Laguna Beach (949) 497-7700

The following schools have a direct potential exposure to wildland fires (listed from North to South). **SIP** indicates Shelter in Place without FD intervention, **SIP ENG** indicates Shelter in Place with at least 1 Type 1 Engine, **EVAC** indicates evacuation preferred with little opportunity for shelter in place. Consider the recommended guidelines for each school below.

EVAC Anneliese School (Private K-8), 20062 Laguna Canyon Road, (949) 497-8310
SIP ENG Top of the World Elementary School (K-5), 21601 Tree Top Lane, (949) 497-7790
SIP ENG Thurston Middle School (6-8), 2100 Park Ave., 497-7785
SIP ENG El Morro School Elementary School (K-5), 8681 North Costa Hwy., (949) 497-7780
EVAC Laguna College of Art and Design (College), 2222 Laguna Canyon Road
SIP ENG Laguna Beach Boys and Girls Club (pre-K), 1085 Laguna Canyon Road
SIP Laguna Beach High School (9-12), 625 Park Ave., (949) 497-7750

ALISO and WOOD CANYON PRE-FIRE PLAN

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SIP	Anneliese School (Private, K-3), 758 Manzanita, (949) 494-7388
SIP	Laguna Beach Presbyterian (Private pre-K) 415 Forest Ave, (949) 494-7555
EVAC	Chabad Jewish Center (Private pre-K), 30804 Coast Hwy., (949) 499-0700
EVAC	Anneliese Pre-School (Private pre-K), 21542 Wesley, (949) 499-5527
EVAC	Heidi's Pre-School (Private, pre-K), 31866 8 th Avenue, (949) 499-4058

INCIDENT FACILITIES**Plan Area: Orange County Thomas Bros Maps**

- * Central Laguna Branch pages 950 and 951
- * South Laguna Branch pages 951 and 971

Helispots/Water Points

<u>Location</u>	<u>Elevation GPS (NAD83)</u>		<u>Thomas Bros.</u>
<u>Water Point:</u>			
Alta Laguna Park	951'	33° 33' 22N / 117° 45' 28W	P. 951, A1
Top of the World School	944'	33° 32' 20N / 117° 45' 08W	P. 951, B2
Fire Road	808'	33° 32' 20N / 117° 45' 13W	P. 951, A3/A4
Moulton Meadows Park	828'	33° 31' 48N / 117° 45' 13W	P. 951, B5
Thurston Middle School	708'	33° 32' 59N / 117° 45' 58W	P. 950, J2
Fred Lang Park	93'	33° 30' 50N / 117° 45' 17W	P. 951, A7
Aliso Beach Park	10'	33° 30' 36N / 117° 45' 07W	P. 951, B7
Pacific Ocean			

Helispot/Helibase:

Crystal Cove State Park	90'	33° 34' 01N / 117° 49' 53W	P. 920, A7/B7
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Staging Areas:

<u>Location</u>	<u>Address</u>	<u>Thomas Bros.</u>	<u>Capacity</u>
Alta Laguna Blvd	2100 – 2900	P. 951, A1/A2	10 ST
Thurston School	2100 Park Ave.	P. 950, J2	5 – 10 ST
Act V Parking Lot	1900 Laguna Canyon Road	P. 950, H1	10 ST
Forest/Broadway Parking Lot	Forest @ Broadway	P. 950, G2	5 – 10 ST
Lumberyard Parking Lot	500 Blk Forest @ City Hall	P. 950, G2	5 ST
Aliso Beach Parking Lot	31131 Coast Hwy.	P. 951, B7	10 ST

Command Post and Incident Base Locations:

<u>Location</u>	<u>Address</u>	<u>Thomas Bros.</u>
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Initial Command Post:

Alta Laguna Park	2100 Alta Laguna Blvd	P. 951, A1
Moulton Meadows Park	Balboa @ Del Mar	P. 951, B5
Laguna Beach Fire Station 3	2900 Alta Laguna Blvd	P. 951, B2

Major Incident Base/Command Post

Soka University	1 University Dr., Aliso Viejo	P. 951, C2
Wild Rivers	8770 Irvine Center Dr., Irvine	P. 891, B3/B4

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Alternate ICP:

Main Beach	Broadway @ Coast Hwy	P. 950, G3
Laguna Beach Senior Center	380 Third Street	P. 950, G3
Laguna Beach High School	625 Park Ave	P. 950, H3

CONTACTS

(Not for Civilian Distribution)

* Phone numbers replaced with (XXX) XXX-XXXX indicate a phone number not for public distribution.

ANIMAL CONTROL

- Laguna Beach Animal Control to assist with domestic animals: Request through Laguna Fire Dispatch (XXX) XXX-XXXX or 5G

FIRE

- Laguna Beach Fire Dispatch: (XXX) XXX-XXXX
- Laguna Beach Fire Department: (949) 497-0700
- Laguna Beach FD Division 1 Chief: Office (XXX) XXX-XXXX Cell (XXX) XXX-XXXX
- Laguna Beach FD Division 2 Chief: Office (XXX) XXX-XXXX Cell (XXX) XXX-XXXX
- Laguna Beach FD Division 3 Chief: Office (XXX) XXX-XXXX Cell (XXX) XXX-XXXX
- OC Fire Authority Dispatch: (XXX) XXX-XXXX
- OC Fire Authority Battalion 4 Chief: Office (XXX) XXX-XXXX, Cell (XXX) XXX-XXXX
- OC Fire Authority Battalion 5 Chief: Office (XXX) XXX-XXXX, Cell (XXX) XXX-XXXX
- OC Fire Authority Battalion 6 Chief: Office (XXX) XXX-XXXX, Cell (XXX) XXX-XXXX
- OC Fire Authority Division 4 Chief: Office (XXX) XXX-XXXX, Cell (XXX) XXX-XXXX
- OC Fire Authority Fire Command 2 Cell: (XXX) XXX-XXXX
- Newport Beach Battalion 6 Chief: Office (XXX) XXX-XXXX, Cell (XXX) XXX-XXXX

LAW ENFORCEMENT

- Laguna Beach Police Dispatch: (XXX) XXX-XXXX
- Laguna Beach Police Department: (949) 497-0701
- California Highway Patrol: (949) 223-5463 or request through OCFA-ECC
- OC Sheriff's Dispatch: (714) 288-6744

MARINE SAFETY

- Laguna Beach Lifeguards: (949) 497-0391 or Laguna Fire Dispatch (XXX) XXX-XXXX or 5G
- U.S. Ocean Safety: (949) 276-5050 or Pager (949) 227-1037 or Laguna Fire Dispatch (XXX) XXX-XXXX or 5G

PARKS

- OC Parks Dept./Aliso and Wood Canyon Park Ranger: WestCom (XXX) XXX-XXXX
- OC Parks, Aliso Beach Ranger: WestCom (XXX) XXX-XXXX
- Laguna Coast Wilderness Park: WestCom (XXX) XXX-XXXX

SCHOOLS

- Laguna Beach Unified School District: (949) 497-7700

ALISO and WOOD CANYON PRE-FIRE PLAN

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SUPPORT SERVICES

- American Red Cross to set up the evacuation center: (714) 481-5300 or request through OCFA-ECC, or LB Dispatch (XXX) XXX-XXXX or 5G

UTILITIES

- Laguna Beach County Water District: LB Dispatch, OCFA ECC or (949) 494-1041
- South Coast Water District: LB Dispatch, OCFA ECC, or (949) 499-4555
- Southern California Edison: LB Dispatch or OCFA ECC
- San Diego Gas and Electric: LB Dispatch or OCFA ECC
- Southern California Gas Co.: LB Dispatch or OCFA ECC
- Sewer, Central Laguna Branch - Laguna Beach County Water District: LB Dispatch, OCFA ECC or (949) 494-1041
- Sewer, South Laguna Branch - South Coast Water District: LB Dispatch, OCFA ECC, or (949) 499-4555

ALISO and WOOD CANYON PRE-FIRE PLAN

City of Laguna Beach Fire Department - Orange County Fire Authority



ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Top of the World</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 2	Fuels 1	Access 2
Civ Safe 1	Topog 2	Water 3
Air Safe 2	Clear 3	Comm 2
Hazmat 3	Const 2	Tac Air 1
	Density 2	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO HAZARDS	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES	
	CIVILIAN SAFETY	Civ Safe	NO HAZARDS	EVACUATE IF TIME PERMITS	SHELTER IN PLACE	
	AIR SAFETY	Air Safe	NO HAZARDS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS	
	HAZMAT	Hazmat	HAZARDOUS MATERIALS	HAZARDS IN BARN & STORAGE SHEDS	NONE	
	S T A T I C	FUELS	Fuels	HEAVY DENSE TREES / BUSH	MODERATE	LIGHT
		TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
		CLEARANCE	Clear	MINIMUM CLEARANCE	30 TO 70 FEET	MORE THAN 70 FEET
		CONSTRUCTION	Const	NON-COMBUSTIBLE ROOF / EXTERIOR	SOME COMBUSTIBLE ROOFS / EXTERIOR	NON-COMBUSTIBLE ROOFS / EXTERIOR
	A T T A C K	STRUCTURAL SPACING	Density	MINIMUM STRUCTURAL SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
		ACCESS	Access	NO ACCESS / POOR ACCESS	ONE LANE PAVED, TURN AROUND, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
WATER		Water	NO HYDRANT SERVICE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS	
COMMUNICATIONS		Comm	NO OVERLAP / POOR RADIO COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE	
TAC AIR SUPPORT		Tac Air	NO TAC AIR SUPPORT	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ'S	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S	

ALISO and WOOD CANYON PRE-FIRE PLAN

City of Laguna Beach Fire Department - Orange County Fire Authority



ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Old Top of the World</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 1	Fuels 1	Access 1
Civ Safe 1	Topog 2	Water 3
Air Safe 2	Clear 1	Comm 2
Hazmat 3	Const 1	Tac Air 1
	Density 1	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO HAZARD ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES	
	CIVILIAN SAFETY	Civ Safe	NO HAZARD ZONES	EVACUATE IF TIME PERMITS	SHELTER IN PLACE	
	AIR SAFETY	Air Safe	AIR OBSTRUCTIONS & AERIAL OBSTRUCTIONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS	
	HAZMAT	Hazmat	HAZARD ZONES	HAZARDS IN BARN & STORAGE SHEDS	NONE	
	--	FUELS	Fuels	HEAVY DENSITY FUELS	MODERATE	LIGHT
		TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
		CLEARANCE	Clear	LOW CLEARANCES	30 TO 70 FEET	MORE THAN 70 FEET
		CONSTRUCTION	Const	NON-FIRE RESISTANT ROOFS / EXTERIOR	SOME COMBUSTIBLE ROOFS / EXTERIOR	NON COMBUSTIBLE ROOFS / EXTERIOR
		STRUCTURAL SPACING	Density	NO SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
		--	ACCESS	Access	NO TURN AROUND AREAS	ONE LANE PAVED, TURN AROUND, ONE WAY IN & OUT
	WATER		Water	NO WATER SOURCE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS
	COMMUNICATIONS		Comm	NO RADIO COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE
TAC AIR SUPPORT	Tac Air		NO TAC AIR SUPPORT	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ's	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ's	
A T T A C K						

ALISO and WOOD CANYON PRE-FIRE PLAN

City of Laguna Beach Fire Department - Orange County Fire Authority



ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Temple Hills</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 2	Fuels 1	Access 2
Civ Safe 1	Topog 1	Water 3
Air Safe 2	Clear 1	Comm 2
Hazmat 3	Const 2	Tac Air 1
	Density 2	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO SAFETY ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES	
	CIVILIAN SAFETY	Civ Safe	NO SAFETY ZONES	EVACUATE IF TIME PERMITS	SHELTER IN PLACE	
	AIR SAFETY	Air Safe	NO SAFETY ZONES	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS	
	HAZMAT	Hazmat	NO SAFETY ZONES	HAZARDS IN BARN & STORAGE SHEDS	NONE	
	--- S T A T I C	FUELS	Fuels	NO SAFETY ZONES	MODERATE	LIGHT
		TOPOGRAPHY	Topog	NO SAFETY ZONES	MEDIUM SLOPE	FLAT
		CLEARANCE	Clear	NO SAFETY ZONES	30 TO 70 FEET	MORE THAN 70 FEET
		CONSTRUCTION	Const	NO SAFETY ZONES	SOME COMBUSTABLE ROOFS / EXTERIOR	NON COMBUSTABLE ROOFS / EXTERIOR
		STRUCTURAL SPACING	Density	NO SAFETY ZONES	SUBDIVISION TRACTS	RURAL, DISPERSED
		ACCESS	Access	NO SAFETY ZONES	ONE LANE PAVED, TURN AROUNDS, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
	--- A T T A C K	WATER	Water	NO SAFETY ZONES	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS
		COMMUNICATIONS	Comm	NO SAFETY ZONES	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE
TAC AIR SUPPORT		Tac Air	NO SAFETY ZONES	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ'S	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S	

ALISO and WOOD CANYON PRE-FIRE PLAN

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ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Bluebird Canyon</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 2	Fuels 1	Access 1
Civ Safe 1	Topog 2	Water 3
Air Safe 1	Clear 2	Comm 2
Hazmat 3	Const 2	Tac Air 1
	Density 1	

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO SAFETY ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES
	CIVILIAN SAFETY	Civ Safe	MINOR OBSTRUCTIONS	EVACUATE IF TIME PERMITS	SHELTER IN PLACE
	AIR SAFETY	Air Safe	AERIAL OBSTRUCTIONS & STEEP CANYONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS
S T A T I C	HAZMAT	Hazmat	SLURRY PILE, SOLID	HAZARDS IN BARN'S & STORAGE SHEDS	NONE
	FUELS	Fuels	HEAVY OR DEAD TREES / BRUSH	MODERATE	LIGHT
	TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
	CLEARANCE	Clear	30 FEET OR LESS	30 TO 70 FEET	MORE THAN 70 FEET
	CONSTRUCTION	Const	PERMITS, COMBUSTABLE ROOFS / EXTERIOR	SOME COMBUSTABLE ROOFS / EXTERIOR	NON COMBUSTABLE ROOFS / EXTERIOR
	STRUCTURAL SPACING	Density	DENSE & LIGHT STRUCTURAL SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
A T T A C K	ACCESS	Access	HAZARDOUS ROAD, NO TURN AROUND AREAS	ONE LANE PAVED, TURN AROUND, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
	WATER	Water	NO WATER SOURCE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS
	COMMUNICATIONS	Comm	OVERALL POOR RADIO OR CELL COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE
	TAC AIR SUPPORT	Tac Air	20 MIN RELOADS & RETURN TIME, NO LZ'S	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ'S	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

ALISO and WOOD CANYON PRE-FIRE PLAN

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ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Arch Beach Heights</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 2	Fuels 1	Access 1
Civ Safe 1	Topog 1	Water 3
Air Safe 1	Clear 1	Comm 2
Hazmat 3	Const 2	Tac Air 1
	Density 1	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO HAZARD ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES	
	CIVILIAN SAFETY	Civ Safe	NO HAZARD ZONES	EVACUATE IF TIME PERMITS	SHELTER IN PLACE	
	AIR SAFETY	Air Safe	AIRWAY OBSTRUCTIONS & AERIAL OBSTRUCTIONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS	
	HAZMAT	Hazmat	HAZARDOUS MATERIALS	HAZARDS IN BARNS & STORAGE SHEDS	NONE	
	--- S T A T I C	FUELS	Fuels	HEAVY FUELS	MODERATE	LIGHT
		TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
		CLEARANCE	Clear	DEBRIS OBSTACLES	30 TO 70 FEET	MORE THAN 70 FEET
		CONSTRUCTION	Const	NON-FIRE RESISTANT ROOFS / EXTERIOR	SOME COMBUSTABLE ROOFS / EXTERIOR	NON COMBUSTABLE ROOFS / EXTERIOR
	--- A T T A C K	STRUCTURAL SPACING	Density	OPEN & SOFT STRUCTURAL SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
		ACCESS	Access	ROADWAY OBSTACLES NO TURN AROUND AREAS	ONE LANE PAVED, TURN AROUNDS, ONE WAY IN & OUT	MIN TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
WATER		Water	NO WATER SOURCE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS	
COMMUNICATIONS		Comm	CRITICAL AREA RADIO OR CELL COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE	
TAC AIR SUPPORT		Tac Air	CRITICAL AREA RELOAD & TURN AROUND AREAS	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ'S	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S	

ALISO and WOOD CANYON PRE-FIRE PLAN
 City of Laguna Beach Fire Department - Orange County Fire Authority



ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Balboa/Nyes</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 2	Fuels 1	Access 2
Civ Safe 1	Topog 1	Water 3
Air Safe 3	Clear 1	Comm 2
Hazmat 3	Const 2	Tac Air 1
	Density 2	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO SAFETY ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES	
	CIVILIAN SAFETY	Civ Safe	IMMEDIATE EVACUATION	EVACUATE IF TIME PERMITS	SHELTER IN PLACE	
	AIR SAFETY	Air Safe	ADVERSE WIND DIRECTION & SPEED OBSTRUCTIONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS	
	HAZMAT	Hazmat	HAZARDOUS WELDER OPERATIONS	HAZARDS IN BARN & STORAGE SHEDS	NONE	
	---	FUELS	Fuels	HEAVY STEADY TRASH BRUSH	MODERATE	LIGHT
		TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
		CLEARANCE	Clear	30 FEET OR LESS	30 TO 70 FEET	MORE THAN 70 FEET
	S T A T I C	CONSTRUCTION	Const	NON-COMBUSTIBLE ROOFS / EXTERIOR	SOME COMBUSTIBLE ROOFS / EXTERIOR	NON-COMBUSTIBLE ROOFS / EXTERIOR
		STRUCTURAL SPACING	Density	WELL SPACED STRUCTURAL SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
		ACCESS	Access	ONE LANE PAVED, TURN AROUND, ONE WAY IN & OUT	ONE LANE PAVED, TURN AROUND, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
WATER		Water	NO WATER SOURCE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS	
---	COMMUNICATIONS	Comm	GENERAL RADIO COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE	
	TAC AIR SUPPORT	Tac Air	20 MIN RELOADS & TURN AROUND TIME, NO LZ'S	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ'S	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S	

ALISO and WOOD CANYON PRE-FIRE PLAN

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ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

Wesley		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 2	Fuels 2	Access 2
Civ Safe 1	Topog 1	Water 2
Air Safe 3	Clear 2	Comm 2
Hazmat 3	Const 2	Tac Air 1
	Density 2	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO SAFETY ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES
	CIVILIAN SAFETY	Civ Safe	IMMEDIATE EVACUATION	EVACUATE IF TIME PERMITS	SHELTER IN PLACE
	AIR SAFETY	Air Safe	AERIAL OBSTRUCTIONS & STEEP CANYONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS
S T A T I C	HAZMAT	Hazmat	HAZARDOUS FLUIDS & GASES	HAZARDS IN BARNs & STORAGE SHEDS	NONE
	FUELS	Fuels	FLUJES AND TRUCKS/BOATS	MODERATE	LIGHT
	TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
	CLEARANCE	Clear	30 FEET OR LESS	30 TO 70 FEET	MORE THAN 70 FEET
	CONSTRUCTION	Const	APPROXIMATELY CLASSIFIED ROOFS / EXTERIOR	SOME COMBUSTABLE ROOFS / EXTERIOR	NON COMBUSTABLE ROOFS / EXTERIOR
A T T A C K	STRUCTURAL SPACING	Density	HOME & NON-STRUCTURAL SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
	ACCESS	Access	NO PAVED ROADS NO TURN AROUND AREAS	ONE LANE PAVED, TURN AROUNDs, ONE WAY IN & OUT	MIN. TWO LANES PAVED, MULTIPLE WAYS IN & OUT
	WATER	Water	NO WATER STORAGE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS
	COMMUNICATIONS	Comm	GENERAL POOR RADIO COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE
	TAC AIR SUPPORT	Tac Air	NO TAC AIR SUPPORT	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ's	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ's

ALISO and WOOD CANYON PRE-FIRE PLAN

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SPECIFIC SITE RISK

<i>Ceanothus</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 1	Fuels 1	Access 1
Civ Safe 1	Topog 1	Water 3
Air Safe 3	Clear 1	Comm 2
Hazmat 3	Const 1	Tac Air 1
	Density 2	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	ADADEQUATE SAFETY ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES
	CIVILIAN SAFETY	Civ Safe	NO EVACUATION	EVACUATE IF TIME PERMITS	SHELTER IN PLACE
	AIR SAFETY	Air Safe	ALONG WITH OBSTRUCTIONS & STEEP CANYONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS
--	HAZMAT	Hazmat	HAZARDOUS FUEL STORAGE	HAZARDS IN BARN & STORAGE SHEDS	NONE
S T A T I C	FUELS	Fuels	HEAVY OR DEAD TREES / BRUSH	MODERATE	LIGHT
	TOPOGRAPHY	Topog	SHARP	MEDIUM SLOPE	FLAT
	CLEARANCE	Clear	30 FEET OR LESS	30 TO 70 FEET	MORE THAN 70 FEET
	CONSTRUCTION	Const	ADADEQUATE COMBUSTIBLE ROOFS / EXTERIOR	SOME COMBUSTIBLE ROOFS / EXTERIOR	NON COMBUSTIBLE ROOFS / EXTERIOR
	STRUCTURAL SPACING	Density	NOISE & VIBRATION STRUCTURAL SPACING	SUBDIVISION TRACTS	RURAL, DISPERSED
--	ACCESS	Access	ADADEQUATE TURN AROUND AND TURN AROUND AREAS	ONE LANE PAVED, TURN AROUNDS, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
A T T A C K	WATER	Water	NO WATER SOURCE	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS
	COMMUNICATIONS	Comm	GENERAL RADIO RADIO OR CELL COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE
	TAC AIR SUPPORT	Tac Air	ADADEQUATE RELOADS & TURN AROUND TIME	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ'S	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S

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SPECIFIC SITE RISK

<i>Mar Vista</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 1	Fuels 1	Access 1
Civ Safe 1	Topog 1	Water 3
Air Safe 3	Clear 1	Comm 2
Hazmat 3	Const 1	Tac Air 1
	Density 2	

1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO SAFETY ZONES	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES
	CIVILIAN SAFETY	Civ Safe	NO SAFETY ZONES	EVACUATE IF TIME PERMITS	SHELTER IN PLACE
	AIR SAFETY	Air Safe	MARGINAL OBSTRUCTIONS & AERIAL OBSTRUCTIONS	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS
--	HAZMAT	Hazmat	HAZARDOUS MATERIAL STORAGE	HAZARDS IN BARNs & STORAGE SHEDS	NONE
	FUELS	Fuels	HEAVY TO HEAVY FUELS	MODERATE	LIGHT
	TOPOGRAPHY	Topog	STEEP	MEDIUM SLOPE	FLAT
S T A T I C	CLEARANCE	Clear	UNRESTRICTED	30 TO 70 FEET	MORE THAN 70 FEET
	CONSTRUCTION	Const	ADJACENT COMBUSTIBLE ROOFS / EXTERIOR	SOME COMBUSTIBLE ROOFS / EXTERIOR	NON COMBUSTIBLE ROOFS / EXTERIOR
	STRUCTURAL SPACING	Density	DEVELOPMENT DENSITY / SUBDIVISION TRACTS	SUBDIVISION TRACTS	RURAL, DISPERSED
--	ACCESS	Access	UNRESTRICTED ROADS / MULTIPLE WAYS	ONE LANE PAVED, TURN AROUNDS, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
	WATER	Water	NO HYDRANTS	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS
	COMMUNICATIONS	Comm	GOOD RADIO COVERAGE	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE
A T T A C K	TAC AIR SUPPORT	Tac Air	5 MIN RELOAD & TURN AROUND TIME	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ's	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S

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ALISO and WOOD CANYON FIRE PLAN

SPECIFIC SITE RISK

<i>Sunset</i>		
RISK ASSESSMENT MATRIX		
SAFETY	STATIC	ATTACK
FF Safe 1	Fuels 1	Access 1
Civ Safe 1	Topog 1	Water 3
Air Safe 3	Clear 1	Comm 2
Hazmat 3	Const 1	Tac Air 1
	Density 2	

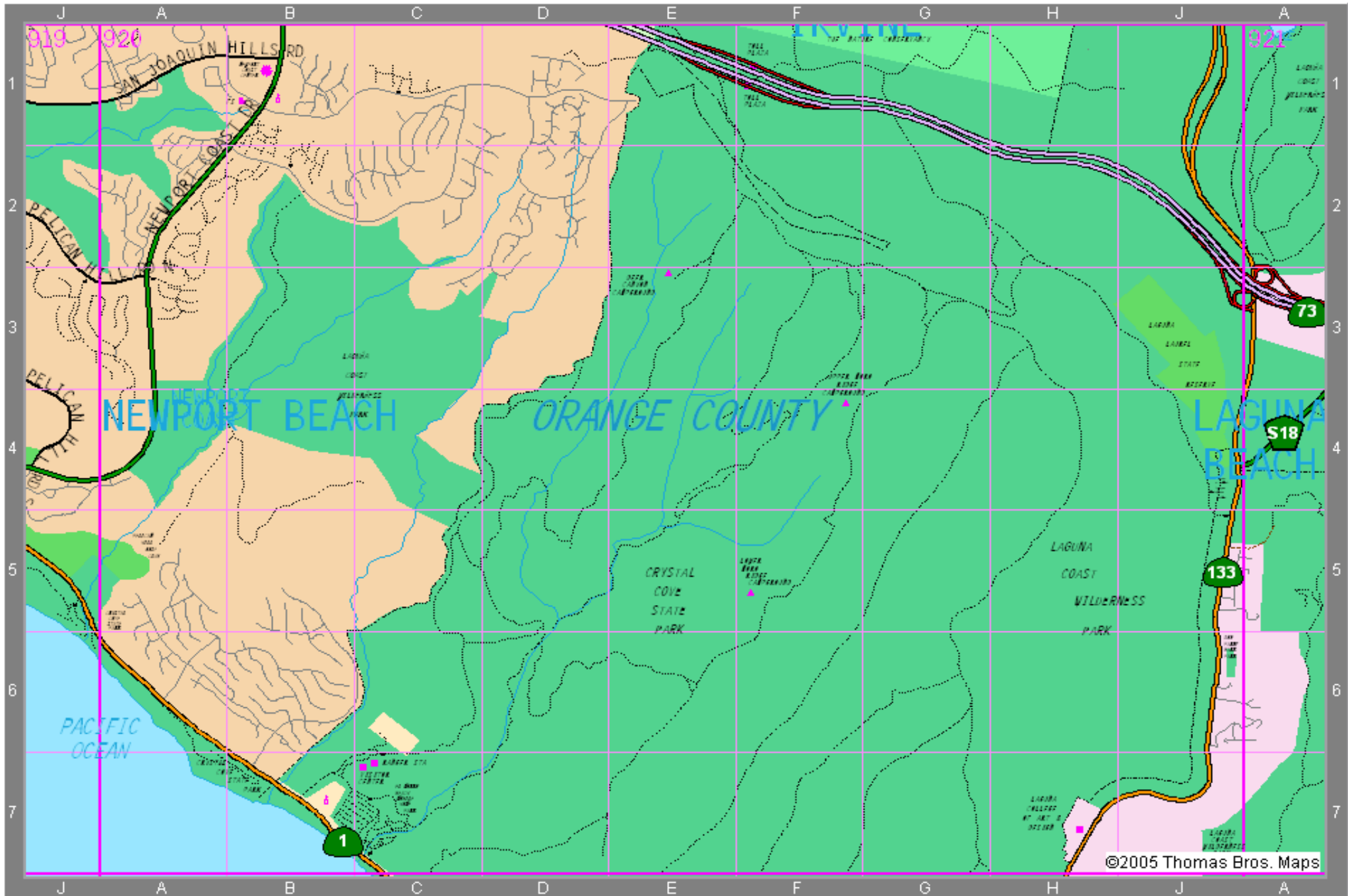
1	2	3
POOR-HIGH RISK	MOD. RISK	GOOD-LOW RISK

RISK COLOR CODE

S A F E T Y	FF SAFETY	FF Safe	NO OBSTRUCTIONS	MARGINAL SAFETY ZONES	ADEQUATE SAFETY ZONES	
	CIVILIAN SAFETY	Civ Safe	NO OBSTRUCTIONS	EVACUATE IF TIME PERMITS	SHELTER IN PLACE	
	AIR SAFETY	Air Safe	AERIAL OBSTRUCTIONS & TREE BRANCHES	STEEP CANYONS OR AERIAL OBSTRUCTIONS	NO HAZARDS	
	HAZMAT	Hazmat	HAZARDOUS MATERIALS	HAZARDS IN BARNs & STORAGE SHEDS	NONE	
	S T A T I C	FUELS	Fuels	HEAVY WOODS	MODERATE	LIGHT
		TOPOGRAPHY	Topog	FLAT	MEDIUM SLOPE	FLAT
		CLEARANCE	Clear	TRIMMED BRANCHES	30 TO 70 FEET	MORE THAN 70 FEET
		CONSTRUCTION	Const	ADDITIONAL COMBUSTIBLE ROOFS / EXTERIOR	SOME COMBUSTIBLE ROOFS / EXTERIOR	NON COMBUSTIBLE ROOFS / EXTERIOR
		STRUCTURAL SPACING	Density	NO OBSTRUCTIONS	SUBDIVISION TRACTS	RURAL, DISPERSED
	A T T A C K	ACCESS	Access	UNIMPROVED ALLEYS	ONE LANE PAVED, TURN AROUNDS, ONE WAY IN & OUT	MIN. TWO LANES, PAVED, MULTIPLE WAYS IN & OUT
WATER		Water	NO PONDING WATER	PONDS, POOLS, LOW FLOW HYDRANTS	GOOD HYDRANTS	
COMMUNICATIONS		Comm	GOOD COMMUNICATIONS	GENERAL RADIO COVERAGE WITH SOME WEAK SPOTS	GOOD RADIO & CELL COVERAGE	
TAC AIR SUPPORT		Tac Air	NO OBSTRUCTIONS	10 TO 15 MIN RELOADS & TURN AROUND TIME, NO LZ's	5 MIN OR LESS RELOAD & RETURN TIME, PLENTY LZ'S	

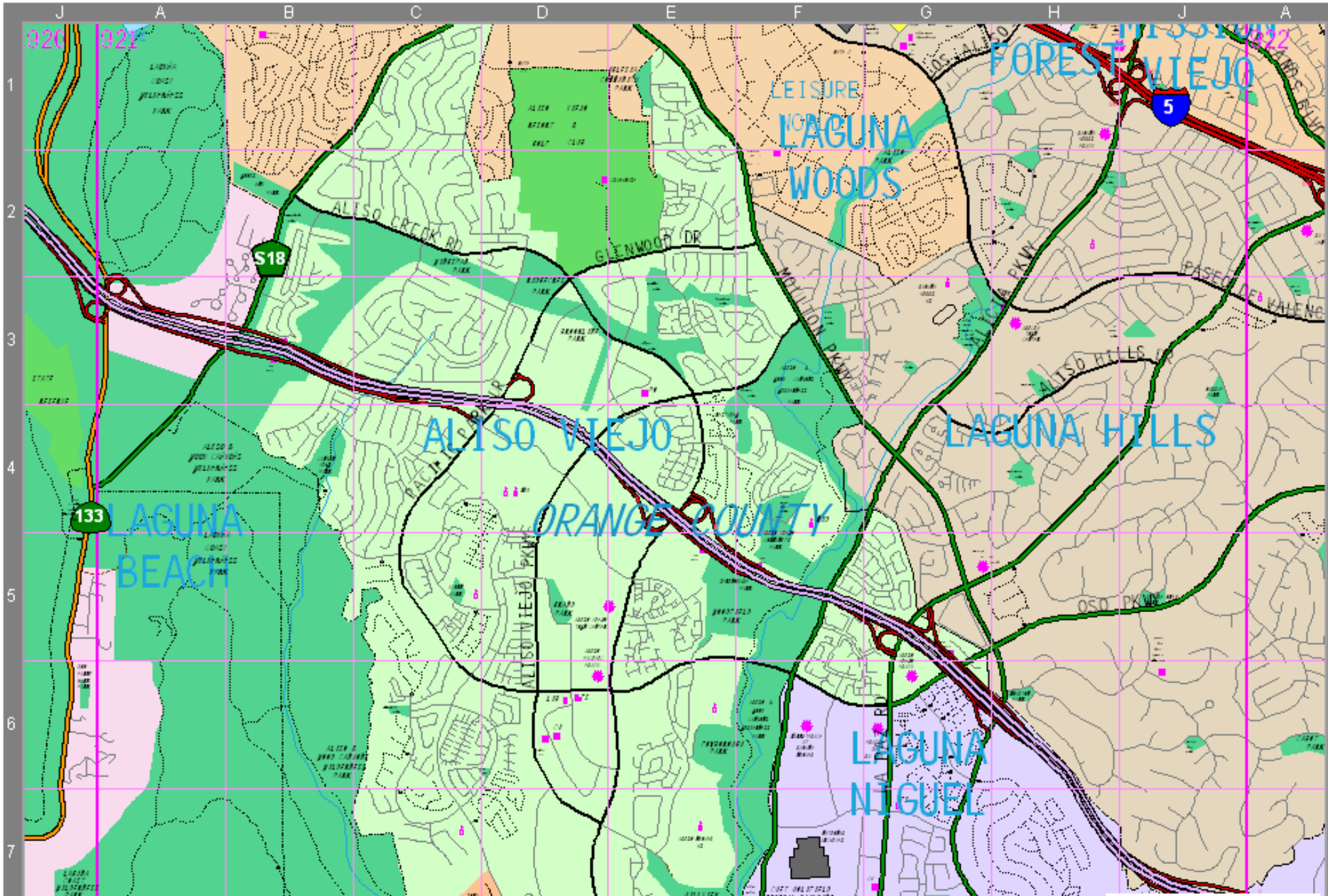
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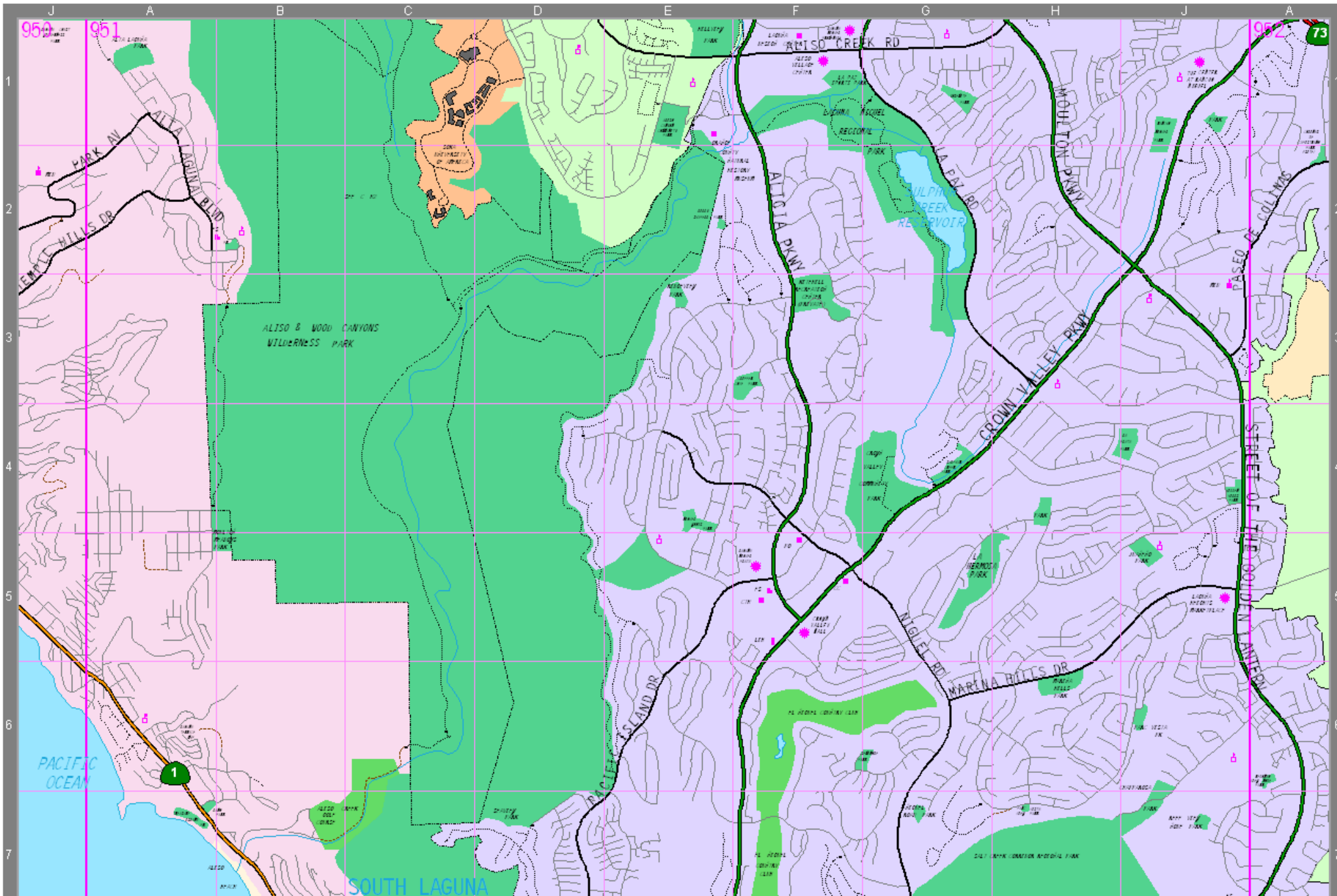
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