

REGULAR MEETING AGENDA

1. Call to Order

2. Approval of Agenda

3. Public Comment

The public may speak to the Commission regarding matters on the agenda that are not scheduled for public hearing or plat consideration. (3 minute time limit).

4. Reconsiderations

5. Adoption of Consent Agenda

All items on the consent agenda are considered routine and non-controversial by the Planning Commission and are approved in one motion. There will be no separate discussion of these items unless requested by a Planning Commissioner or someone from the public, in which case the item will be moved to the regular agenda.

A. Approval of minutes of December 6, 2017 **p. 1**

6. Presentations

7. Reports

A. Staff Report 18-01, City Planner's Report **p. 7**

8. Public Hearings

Testimony limited to 3 minutes per speaker. The Commission conducts Public Hearings by hearing a staff report, presentation by the applicant, hearing public testimony and then acting on the Public Hearing items. The Commission may question the public. Once the public hearing is closed the Commission cannot hear additional comments on the topic. The applicant is not held to the 3 minute time limit.

9. Plat Consideration

A. Staff Report 18-02, Tsunami View No. 2 Preliminary Plat **p. 9**

B. Staff Report 18-03, J. Waddell Survey Dierich Addition Lot 4B-3A 2018 Replat Preliminary Plat **p. 25**

10. Pending Business

11. New Business

A. Staff Report 18-04, Election of Officers **p. 37**

B. Staff Report 18-05, Natural Hazards Planning **p. 39**

C. 2018 Draft Land Allocation Plan - Memo from Julie Engebretsen, Deputy City Planner **p. 113**

12. Informational Materials

A. City Manager's Reports for the December 11, 2017 City Council Meeting **p. 231**

13. Comments of the Audience

Members of the audience may address the Commission on any subject. (3 min limit)

14. Comments of Staff

15. Comments of the Commission

16. Adjournment

The next regular meeting is scheduled for Wednesday January 17, 2018. Meetings will adjourn promptly at 9:30 p.m. An extension is allowed by a vote of the Commission.

Session 17-14, a Regular Meeting of the Homer Advisory Planning Commission was called to order by Chair Don Stead at 6:30 p.m. on December 6, 2017 at the City Hall Cowles Council Chambers located at 491 E. Pioneer Avenue, Homer, Alaska.

PRESENT: COMMISSIONERS BANKS, HIGHLAND, STEAD AND VENUTI

ABSENT: COMMISSIONER BOS, BERNARD, AND BENTZ (EXCUSED)

STAFF: CITY PLANNER ABBOD
DEPUTY CITY CLERK KRAUSE

Approval of the Agenda

Chair Stead called for a motion to approve the agenda.

HIGHLAND/VENUTI SO MOVED.

There was no discussion.

VOTE. NON-OBJECTION. UNANIMOUS CONSENT.

Motion carried.

Public Comment

The public may speak to the Planning Commission regarding matters on the agenda that are not scheduled for public hearing or plat consideration. (3 minute time limit).

Reconsideration

Adoption of Consent Agenda

All items on the consent agenda are considered routine and non-controversial by the Planning Commission and are approved in one motion. There will be no separate discussion of these items unless requested by a Planning Commissioner or someone from the public, in which case the item will be moved to the regular agenda and considered in normal sequence.

A. Approval of minutes of November 1, 2017

B. Time Extension Requests

1. Marley Subdivision Time Extension Request

C. Decisions and Findings for Cup 17-08, for a three story 72 room hotel at 91 Sterling Highway

Chair Stead requested a motion to approve the consent agenda.

VENUTI/BANKS – SO MOVED.

There was no discussion.

VOTE. NON-OBJECTION. UNANIMOUS CONSENT.

Motion carried.

PRESENTATIONS

REPORTS

A. Staff Report 17-90, City Planner's report

City Planner Abboud reviewed the staff report. He requested volunteers for the January 8, 2018 Council meeting.

It was agreed by consensus that a volunteer could be solicited at the next commission meeting.

PUBLIC HEARINGS

Testimony limited to 3 minutes per speaker. The Commission conducts Public Hearings by hearing a staff report, presentation by the applicant, hearing public testimony and then acting on the Public Hearing items. The Commission may question the public. Once the public hearing is closed the Commission cannot hear additional comments on the topic. The applicant is not held to the 3 minute time limit.

A. Staff Report 17-91, Ordinance to Add Retail Marijuana Facilities as a permitted use in the Marine Commercial District under Homer City Code 21.28.020

City Planner Abboud stepped to the map displaying the areas on the Spit where this ordinance would be applied then reviewed the staff report.

Chair Stead opened the public hearing.

Don Tippy, city resident, commented he has managed a store on the spit for 2 years, that he receives numerous inquiries from visitors where they can find a dispensary, the city is in fact losing a lot of money. He reported that eleven times he was asked where a dispensary was this past summer and that they received 11 cruise ship visits.

Chair Stead closed the public hearing having no further testimony from the public present.

Staff did not have any comments or rebuttal. Chair Stead asked for questions from the commission.

A question and response period ensued between Commissioners and City Planner Abboud on the following:

- changes and considerations that may have come up since the first time this issue was brought before them;

- Could try a limited or trial period zoning to see how this zoning would work.
- Postponement until a full Commission is present
- Laws regarding open container alcohol versus open consumption marijuana is not a zoning issue
- Legality on cruise ships is not a zoning issue
- Liquor stores are considered retail operations, and are legal
- Marijuana is different in that the State has decided to abide by the Cole Memorandum
- Marijuana is on the spit and currently would be considered black market, the voters have spoken, it is legal and as testified tonight there is the revenue aspect
- Marijuana is still illegal in Federal waters, is not allowed on a vessel and so there is hesitation on providing a legal source on the spit.
- Letters received in support and against and it still carries the connotation of illegality

VENUTI/BANKS MOVED TO RECOMMEND CITY COUNCIL ALLOW RETAIL MARIJUANA FACILITIES AS A PERMITTED USE IN THE MARINE COMMERCIAL DISTRICT UNDER HOMER CITY CODE 21.28.020

Discussion ensued on separating the law enforcement issues from the zoning issues.

HIGHLAND/VENUTI MOVED TO POSTPONE TO THE JANUARY 17, 2018 MEETING UNTIL A FULL COMMISSION IS PRESENT.

Brief discussion on attendance of commissioners.

VOTE. (Postponement)NON-OBJECTION. UNANIMOUS CONSENT.

Motion carried.

B. Staff Report 17-92, Ordinance to Allow One Employee Occupied RV per lot in the Marine Commercial and Marine Industrial Districts under Homer City Code 21.54

City Planner Abboud reviewed the staff report.

There was no applicant and Chair Stead opened the Public Hearing.

Don Tippy, city resident, commented and requested clarification on the definition that the recreational vehicle is provided to an employee by his or her employer for housing, he manages a business on the spit, works 16 hours days and owns an RV. He would like to know why that is a preference for the employer to provide the RV since if he owned a business he would not be buying an employee a RV to live in unless they could charge the employee but according to the rules that's not allowed.

Chair Stead allowed City Planner Abboud to respond to the request for clarification.

City Planner Abboud responded that it was a provision provided by the City Attorney to assist in enforcement of the regulation.

There was no more public testimony and Chair Stead closed the Public Hearing.

A discussion ensued on the intent of the definition and application, what was covered under the term “recreational vehicle”; that a business owner was not an employee in accordance with the Internal Revenue Service; the requirement on the owner to provide the housing; the difficulty to enforce; suggestions to reword the definition to address the intent of the Commission and provide clarification and comment received from the public.

VENUTI MOVED TO AMEND LINE 289 TO READ EMPLOYEE OCCUPIED RECREATIONAL VEHICLE MEANS A RECREATIONAL VEHICLE UTILIZED BY AN EMPLOYEE OR OWNER FOR HOUSING.

BANKS/VENUTI MOVED TO AMEND TO READ AS EMPLOYEE OCCUPIED RECREATIONAL VEHICLE MEANS A RECREATIONAL VEHICLE UTILIZED BY AN EMPLOYEE OR THE OWNER FOR HOUSING.

There was a brief discussion on the intent of the motion. There was a question on including his or her term in the definition.

Chair Stead re-stated the amendment to the main motion:
MOVED THAT “EMPLOYEE OCCUPIED RECREATIONAL VEHICLE” MEANS A RECREATIONAL VEHICLE UTILIZED BY AN EMPLOYEE OR OWNER FOR HOUSING

There was no additional discussion.

VOTE: (Amendment).NON-OBJECTION. UNANIMOUS CONSENT.

Motion carried.

Chair Stead inquired if there was additional discussion on the main motion as amended.

Hearing none, Chair Stead re-stated the main motion as amended:
MOVED TO AMEND LINE 289 TO READ EMPLOYEE OCCUPIED RECREATIONAL VEHICLE MEANS A RECREATIONAL VEHICLE UTILIZED BY AN EMPLOYEE OR OWNER FOR HOUSING.

VOTE. NON-OBJECTION. UNANIMOUS CONSENT.

Motion carried

Chair Stead requested a motion to recommend the draft ordinance to City Council.

VENUTI/HIGHLAND MOVED TO ADOPT STAFF REPORT 17-92 TO ALLOW ONE EMPLOYEE OR BUSINESS OWNER OCCUPIED RECREATIONAL VEHICLE PER LOT IN THE MARINE COMMERCIAL AND INDUSTRIAL DISTRICTS UNDER HOMER CITY CODE 21.54

BANKS/HIGHLAND MOVED TO APPEND THE MOTION TO FORWARD THE DRAFT ORDINANCE AS AMENDED TO CITY COUNCIL.

There was brief discussion on public comments submitted and enforcement once this is implemented.

VOTE (Amendment). NON-OBJECTION. UNANIMOUS CONSENT.

Motion is carried.

Chair Stead inquired is there was any additional discussion on the motion as amended.

There was no further discussion.

VOTE. (Main motion.) NON-OBJECTION. UNANIMOUS CONSENT.

Motion carried.

PLAT CONSIDERATION

PENDING BUSINESS

A. Staff Report 17-93, Comprehensive Plan Update, Chapter 6 Public Services and Facilities

Chair Stead read the title into the record and invited City Planner Abboud to review his report.

Commissioner Banks requested a brief recess. Chair Stead called for a five minute recess at 7:48 p.m. The meeting was called back to order at 7:53 p.m.

City Planner Abboud reviewed the additions submitted to Chapter 6 by Public Works Director Meyer. He provided clarification at the request of commissioners on the following:

- pages 141 and 142, Section I-F-4 and I-F-7
- The existing sewer system is adequate to handle additional needs of the city as shown by the information provided by Public Works Director Meyer.

City Planner Abboud noted that this document will be combined and a draft comprehensive plan should be available for input from the public after the first of the year. He anticipated conducting possibly an Open House event, putting notices in the paper and having electronic options for public input.

NEW BUSINESS

INFORMATIONAL MATERIALS

A. City Manager's Report for October 30, 2017 City Council Meeting

Chair Stead recommended reading the City Manager's report as it was very informative.

COMMENTS OF THE AUDIENCE

COMMENTS OF THE STAFF

City Planner Abboud had no further comments.

Deputy City Clerk Krause wished the commission Happy Holidays.

COMMENTS OF THE COMMISSION

Commissioner Banks had no comments.

Commissioner Venuti commented on elections being conducted in August. Commissioner Stead responded that he thought he was re-elected and Commissioner Highland could not recall. Commissioner Venuti then wished everyone a Merry Christmas and Happy New Year.

It was noted that Staff will double check on that issue of elections.

Commissioner Highland commented on looking forward to discussing the natural hazards next meeting and wanted to include other areas of the city. If I don't see anyone before, see you next year.

Chair Stead wished everyone a Merry Christmas and Happy New Year. See everyone next year.

ADJOURN

There being no further business to come before the Commission, the meeting adjourned at 8:30 p.m. The next regular meeting is scheduled for Wednesday, JANUARY 3, 2018 at 6:30 p.m. in the City Hall Cowles Council Chambers. There is a worksession scheduled at 5:30 p.m. prior to the meeting.

RENEE KRAUSE, CMC, DEPUTY CITY CLERK I

Approved: _____



City of Homer

www.cityofhomer-ak.gov

Planning

491 East Pioneer Avenue
Homer, Alaska 99603

Planning@ci.homer.ak.us

(p) 907-235-3106

(f) 907-235-3118

TO: Homer Advisory Planning Commission
FROM: Rick Abboud, City Planner
DATE: January 3, 2018
SUBJECT: City Planner's Report PL 18-01

City Council - 1.8.18

Introduction of Employee-Occupied RV use in the Marine Industrial and Commercial Districts

2017 saw steady development throughout town. Single family homes continue to be built and many properties were improved. Currently we are seeing business property expansion and rehabilitation even through the downturn in the Alaska economy. I am not seeing any particular local slowdowns in the pace of development. We continue to see the slow and steady pace of development that Homer is used to seeing. Finding affordable lots to develop seems to be the challenge.

A summary of 2017 activity:

New residential: 35 permits valued at 15 million

New commercial: 7 permits valued at 2.1 million

Residential additions: 11 permits valued at 320k

Commercial additions: 4 permits valued at 3 million

*note: value is self-reported. The office routinely adjusts the most unrealistic estimates upward. Even after adjustments, I would have to guess that the number is still undervalued (my favorite question about value, would you build me a structure for that cost?).

2018 should usher in the marijuana industry into Homer. I expect to see at least a cultivation and some retail options be developed.

Planning Commission report schedule for City Council meetings

January 8:

January 22:

February 11:

February 26



City of Homer

www.cityofhomer-ak.gov

Planning

491 East Pioneer Avenue
Homer, Alaska 99603

Planning@ci.homer.ak.us
(p) 907-235-3106
(f) 907-235-3118

Staff Report 18-02

TO: Homer Advisory Planning Commission
FROM: Travis Brown, Planning Technician
THROUGH: Rick Abboud, City Planner
DATE: January 3, 2018
SUBJECT: Tsunami View No. 2 Preliminary Plat

Requested Action: Recommend approval of this preliminary plat to the Kenai Peninsula Borough

General Information:

Applicants:	Gary & Stacey Nelson 152 Dehel Ave. Homer, AK 99603	Robert & Bethine Nehus 210 W Bayview Ave. Homer, AK 99603
Location:	Near the intersection of Main Street and Mountain View Drive	
Parcel ID:	17504016	
Size of Existing Lot(s):	9.5 acres, 0.51 acres	
Size of Proposed Lots(s):	8.48 acres, 1.37	
Zoning Designation:	Rural Residential District & Residential Office District	
Existing Land Use:	One lot has a house and a garage apartment, the other has a house	
Surrounding Land Use:	North: Undevelopable steep slope South: Single family homes, park East: Single family homes West: South Peninsula Hospital	
Comprehensive Plan:	Chapter 4, Goal 2 – Maintain the quality of Homer’s natural environment and scenic beauty.	
Wetland Status:	The 2005 wetland mapping shows no wetland areas.	
Flood Plain Status:	Zone D, flood hazards undetermined.	
BCWPD:	Not within the Bridge Creek Watershed Protection District.	
Utilities:	City water and sewer are available	
Public Notice:	Notice was sent to 81 property owners of 84 parcels as shown on the KPB tax assessor rolls.	

Analysis: The larger lot is located in the Rural Residential District and the smaller lot is located within the Residential Office District. This subdivision will combine a portion of the larger lot with the smaller lot.

Homer City Code 22.10.051 Easements and rights-of-way

- A. The subdivider shall dedicate in each lot of a new subdivision a 15-foot-wide utility easement immediately adjacent to the entire length of the boundary between the lot and each existing or proposed street right-of-way.

Staff Response: Depict a 15' utility easement fronting the dedicated 30' ROW (per this plat) along Dehel Ave.

- B. The subdivider shall dedicate in each lot of a new subdivision any water and/or sewer easements that are needed for future water and sewer mains shown on the official Water/Sewer Master Plan approved by the Council.

Staff Response: The City is requesting a private sewer easement. See comments below.

- C. The subdivider shall dedicate easements or rights-of-way for sidewalks, bicycle paths or other non-motorized transportation facilities in areas identified as public access corridors in the Homer Non-Motorized Transportation and Trail Plan, other plans adopted by the City Council, or as required by the Kenai Peninsula Borough Code.

Staff Response: The plat meets these requirements. None are noted.

Preliminary Approval, per KPB code 20.25.070 Form and contents required. The commission will consider a plat for preliminary approval if it contains the following information at the time it is presented and is drawn to a scale of sufficient size to be clearly legible.

- A. Within the Title Block:
 - 1. Names of the subdivision which shall not be the same as an existing city, town, tract or subdivision of land in the borough, of which a plat has been previously recorded, or so nearly the same as to mislead the public or cause confusion;
 - 2. Legal description, location, date, and total area in acres of the proposed subdivision; and
 - 3. Name and address of owner(s), as shown on the KPB records and the certificate to plat, and registered land surveyor;

Staff Response: The plat meets these requirements.

- B. North point;

Staff Response: The plat meets these requirements.

- C. The location, width and name of existing or platted streets and public ways, railroad rights-of-way and other important features such as section lines or political subdivisions or municipal corporation boundaries abutting the subdivision;

Staff Response: The plat meets these requirements.

- D. A vicinity map, drawn to scale showing location of proposed subdivision, north arrow if different from plat orientation, township and range, section lines, roads, political boundaries and prominent natural and manmade features, such as shorelines or streams;

Staff Response: The plat meets these requirements.

- E. All parcels of land including those intended for private ownership and those to be dedicated for public use or reserved in the deeds for the use of all property owners in the proposed subdivision, together with the purposes, conditions or limitation of reservations that could affect the subdivision;

Staff Response: The plat meets these requirements.

- F. The names and widths of public streets and alleys and easements, existing and proposed, within the subdivision; [Additional City of Homer HAPC policy: Drainage easements are normally thirty feet in width centered on the drainage. Final width of the easement will depend on the ability to access the drainage with heavy equipment. An alphabetical list of street names is available from City Hall.]

Staff Response: The plat meets these requirements.

- G. Status of adjacent lands, including names of subdivisions, lot lines, lock numbers, lot numbers, rights-of-way; or an indication that the adjacent land is not subdivided;

Staff Response: The plat meets these requirements.

- H. Approximate location of areas subject to inundation, flooding or storm water overflow, the line of ordinary high water, wetlands when adjacent to lakes or non-tidal streams, and the appropriate study which identifies a floodplain, if applicable;

Staff Response: The plat meets these requirements.

- I. Approximate locations of areas subject to tidal inundation and the mean high water line;

Staff Response: The plat meets these requirements.

- J. Block and lot numbering per KPB 20.60.140, approximate dimensions and total numbers of proposed lots;

Staff Response: The plat meets these requirements.

- K. Within the limits of incorporated cities, the approximate location of known existing municipal wastewater and water mains, and other utilities within the subdivision and immediately abutting thereto or a statement from the city indicating which services are currently in place and available to each lot in the subdivision;

Staff Response: The plat meets these requirements.

- L. Contours at suitable intervals when any roads are to be dedicated unless the planning director or commission finds evidence that road grades will not exceed 6 percent on arterial streets, and 10 percent on other streets;

Staff Response: The plat meets these requirements.

- M. Approximate locations of slopes over 20 percent in grade and if contours are shown, the areas of the contours that exceed 20 percent grade shall be clearly labeled as such;

Staff Response: The plat meets these requirements.

- N. Apparent encroachments, with statement indicating how the encroachments will be resolved prior to final plat approval; and

Staff Response: The plat meets these requirements.

- O. If the subdivision will be finalized in phases, all dedications for through streets as required by KPB 20.30.030 must be included in the first phase.

Staff Response: N/A.

Public Works Comments:

Public Works has no objection to vacating the existing water line easement (per BK 37 PG. 286) running diagonal across proposed Lot 1

Depict the 15' utility easement fronting the dedicated 30' ROW (per this plat) along Dehel Ave.

Homer City Code 13.24.040(f) and 13.28.030(f) requires that no sewer service or water service be provided to a lot that does not have mainline directly adjacent to it, except with the permission of the PW Director, where no other mainline will be constructed to serve lots. Lots 1 and 2 are considered to have mainline frontage. There is an existing sewer service that crosses lot 2 to service a structure on lot 1.

PW will grant an exception for the existing gravity sewer service that crosses lot 2 to service an existing structure on lot 1.

Provide and depict a 20' private sewer easement (for the benefit of lot 1) centered along the 4" sewer line that crosses lot 2 to service a structure on lot 1. A plat note should describe what the easement is for.

An installation agreement may be needed for the abandonment of a 2" curb stop that currently (for future use) is in place on Lot 1 and services lot 2. Lot 2 will be serviced from the water main fronting the property in Bayview Ave.

The surveyor is asking for an exception to road construction in dedicated right-of-ways.

Public Works has no objection to granting an exception to road construction (per Homer City Code 22.10.050 subdivision improvement requirements) within new ROW dedications, based on these findings:

-The Hohe street road improvements cannot be constructed to meet COH road design criteria (slope on Hohe Street north of Bayview Avenue is 18% grade. Per Homer City Code 11.04.058 local residential roads cannot exceed 12% grade).

The Main street ROW dedication is for the benefit of the existing waterline and no future public access is anticipated.

This plat creates an easement for the maintenance and access to the mid hill PRV stairway, 30' centered on the stairway and retaining wall.

Fire Department Comments: Concerned about fire truck access on a steep grade if access were to be constructed on Hohe St.

Staff Recommendation:

Planning Commission recommend approval of the preliminary plat with the following comments:

1. Public Works has no objection to vacating the existing water line easement (per BK 37 PG. 286) running diagonal across proposed Lot 1.
2. Depict the 15' utility easement fronting the dedicated 30' ROW (per this plat) along Dehel Ave.
3. Provide and depict a 20' private sewer easement (for the benefit of lot 1) centered along the 4" sewer line that crosses lot 2 to service a structure on lot 1. A plat note should describe what the easement is for.
4. An installation agreement may be needed for the abandonment of a 2" curb stop that currently (for future use) is in place on Lot 1 and services lot 2. Lot 2 will be serviced from the water main fronting the property in Bayview Ave.
5. Public Works has no objection to granting an exception to road construction (per Homer City Code 22.10.050 subdivision improvement requirements) within new ROW dedications for the reasons listed above.
6. Create an easement for the maintenance and access to the mid hill PRV stairway, 30' centered on the stairway and retaining wall.

Attachments:

1. Preliminary Plat
2. Surveyor's Letter
3. Public Notice
4. Aerial Map

CERTIFICATE OF OWNERSHIP

We hereby certify that we are the owners of the real property shown and described hereon, and that we hereby adopt this plan of subdivision, and by our free consent, dedicate all public rights-of-way and grant all easements to the use shown.

Gary D. Nelson (for former lots 1-3) 152 Dehel Ave. Homer, AK 99603
Stacey R. Nelson (for former lots 1-3) 152 Dehel Ave. Homer, AK 99603

NOTARY'S ACKNOWLEDGMENT

For Gary D. Nelson
Acknowledged before me this _____ day
of _____ 2016.

Notary public for Alaska My Commission Expires _____

NOTARY'S ACKNOWLEDGMENT

For Stacey R. Nelson
Acknowledged before me this _____ day
of _____ 2016.

Notary public for Alaska My Commission Expires _____

Robert D. Nehus (for former lot 7A) 210 W Bayview Ave. Homer, AK 99603
Bethine M. Nehus (for former lot 7A) 210 W Bayview Ave. Homer, AK 99603

NOTARY'S ACKNOWLEDGMENT

For Robert D. Nehus
Acknowledged before me this _____ day
of _____ 2016.

Notary public for Alaska My Commission Expires _____

NOTARY'S ACKNOWLEDGMENT

For Bethine M. Nehus
Acknowledged before me this _____ day
of _____ 2016.

Notary public for Alaska My Commission Expires _____

NOTES

1. NO PERMANENT STRUCTURE SHALL BE CONSTRUCTED OR PLACED WITHIN AN EASEMENT WHICH WOULD INTERFERE WITH THE ABILITY OF A UTILITY TO USE THE EASEMENT.
2. DEVELOPMENT ON THESE LOTS IS SUBJECT TO HOMER CITY CODE.
3. GREY SHADING INDICATES SLOPES 20 PERCENT AND STEEPER.
4. THIS PLAT COMBINES LOT 7A OF FAIRVIEW SUBDIVISION NEHUS ADDITION INTO LOT 2 SHOWN HEREON..

LEGEND

- CLEAN OUT FOR SEWER LINE
- WATER SHUT OFF VALVE
- POWER POLE

PLAT APPROVAL

This plat was approved by the Kenai Peninsula Borough Planning Commission at the meeting of _____

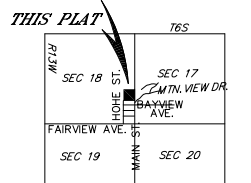
BY _____
Authorized Official

PLAT #
Rec Dist
Date _____ 20__
Time _____ M

KPB FILE No. 2017-

VICINITY MAP

SCALE: 1" = 1 MILE



DATE	11-30-2017	JOB No.	4594
SCALE	1" = 50'	DRAWING	4594ADJ C17

TSUNAMI VIEW No. 2

A SUBDIVISION OF THE SE1/4 NE1/4 SE1/4 SEC. 18, T6S, R13W, S.M., CITY OF HOMER, KENAI PENINSULA BOROUGH, ALASKA; EXCEPTING THEREFROM THE PARCEL CONVEYED BY WARRANTY DEED FILED AT BOOK 37 PAGE 288 IN THE HOMER RECORDING DISTRICT. CONTAINING 9.469 ACRES.

OWNER'S:
GARY D. NELSON & STACEY R. NELSON
152 DEHEL AVE.
HOMER, AK 99603

ROBERT D. NEHUS & BETHINE M. NEHUS
210 W BAYVIEW AVE.
HOMER, AK 99603

ABILITY SURVEYS

GARY NELSON, P.E.S.
(907) 235-8440
152 DEHEL AVE., HOMER ALASKA 99603

ABILITY SURVEYS

SURVEYING HOMER SINCE 1975

LAND SURVEYING - CONSTRUCTION SURVEYING - DESIGN SURVEYING
152 DEHEL AVE. , HOMER, AK. 99603 PH. 907-235-8440 FAX. 235-8440

12/01/2017

City of Homer Planning Dept.
491 E. Pioneer Ave.
Homer, AK 99603

Re: Preliminary Plat submittal of **TSUNAMI VIEW NO. 2 (SUBDIVISION)**.

Enclosed herewith are 1 reduced to 11 X 17 copy of the preliminary plat and 1 full sized 24"X 36" copy, and a check # **4283** in the amount of \$300 for the City of Homer filing fee.

The proposed subdivision is located between the Hospital and the large City Water Tank (easterly of Hospital).

This plat action facilitates a lot line adjustment so that one neighbor can purchase adjacent land from another.

Our first attempt at this in 2015 met with city requirements estimated to cost more than \$20,000 to reroute a waterline to the desired land of sale, in effect a "deal killer".

The existing Parcels are serviced by city water and sewer.

I believe the area is zoned as "Rural Residential".

I do ask for exemption to road construction within new right-of-way dedications (HCC 22.10.050, subdivision improvement requirements), because adjacent roadways are not constructed to city standards, and City street lights are unwanted and unnecessary city expense for the location. Also for the dead-end nature of the dedications and limited lots to service.

I am not aware of other necessary code exemptions at this time but reserve a right to ask for it if one is found to be necessary.

Thank you for your assistance and consideration in this endeavor. Please don't hesitate to call for any reason.

Sincerely,


Gary Nelson, PLS

RECEIVED

DEC 01 2017

CITY OF HOMER
PLANNING/ZONING

NOTICE OF SUBDIVISION

Public notice is hereby given that a preliminary plat has been received proposing to subdivide or replat property. You are being sent this notice because you are an affected property owner within 500 feet of a proposed subdivision and are invited to comment.

Proposed subdivision under consideration is described as follows:

Tsunami View No. 2 Preliminary Plat

The location of the proposed subdivision affecting you is provided on the attached map. A preliminary plat showing the proposed subdivision may be viewed at the City of Homer Planning and Zoning Office. Subdivision reviews are conducted in accordance with the City of Homer Subdivision Ordinance and the Kenai Peninsula Borough Subdivision Ordinance. A copy of the Ordinance is available from the Planning and Zoning Office. **Comments should be guided by the requirements of those Ordinances.**

A public meeting will be held by the Homer Advisory Planning Commission on Wednesday, January 03, 2018 at 6:30 p.m. at Homer City Hall, Cowles Council Chambers, 491 East Pioneer Avenue, Homer, Alaska.

Anyone wishing to present testimony concerning this matter may do so at the meeting or by submitting a written statement to the Homer Advisory Planning Commission, 491 East Pioneer Avenue, Homer, Alaska 99603, by 4:00 p.m. on the day of the meeting.

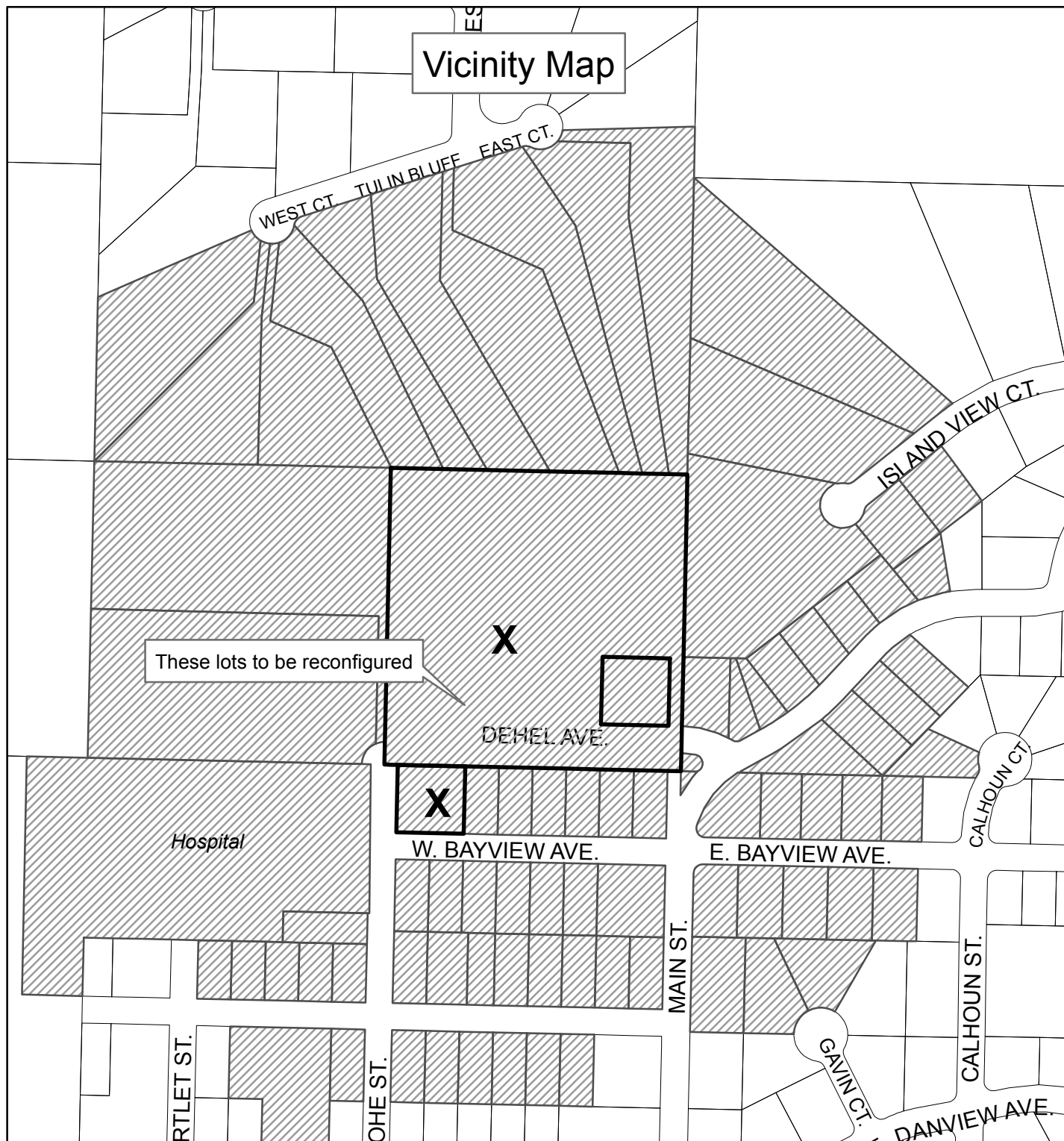
The complete proposal is available for review at the City of Homer Planning and Zoning Office located at Homer City Hall. For additional information, please contact Rick Abboud in the Planning and Zoning Office, 235-3106.

NOTICE TO BE SENT TO PROPERTY OWNERS WITHIN 500 FEET OF PROPERTY.

.....

VICINITY MAP ON REVERSE

Vicinity Map



City of Homer
Planning and Zoning Department

December 18, 2017

Tsunami View No 2 Preliminary Plat

Marked lots are within 500 feet
and property owners notified.

0 250 500
Feet



Disclaimer:
It is expressly understood the City of
Homer, its council, board,
departments, employees and agents are
not responsible for any errors or omissions
contained herein, or deductions, interpretations
or conclusions drawn therefrom.

CERTIFICATE OF OWNERSHIP

We hereby certify that we are the owners of the real property shown and described herein, and that we have duly paid all taxes, assessments, and all other liens and claims against said property, and grant all easements to the use shown.

Stacey R. Nelson (for former lots 1-3)
1520 W. Bayview Ave.
Homer, AK 99603

NOTARY'S ACKNOWLEDGMENT

I, Stacey R. Nelson, Notary Public for Alaska, do hereby certify that the foregoing is a true and correct copy of the original as presented to me on this 10th day of May, 2016.

NOTARY'S ACKNOWLEDGMENT

I, Stacey R. Nelson, Notary Public for Alaska, do hereby certify that the foregoing is a true and correct copy of the original as presented to me on this 10th day of May, 2016.

Robert D. Nelson (for former lot 7A)
210 W. Bayview Ave.
Homer, AK 99603

NOTARY'S ACKNOWLEDGMENT

I, Robert D. Nelson, Notary Public for Alaska, do hereby certify that the foregoing is a true and correct copy of the original as presented to me on this 10th day of May, 2016.

NOTARY'S ACKNOWLEDGMENT

I, Robert D. Nelson, Notary Public for Alaska, do hereby certify that the foregoing is a true and correct copy of the original as presented to me on this 10th day of May, 2016.

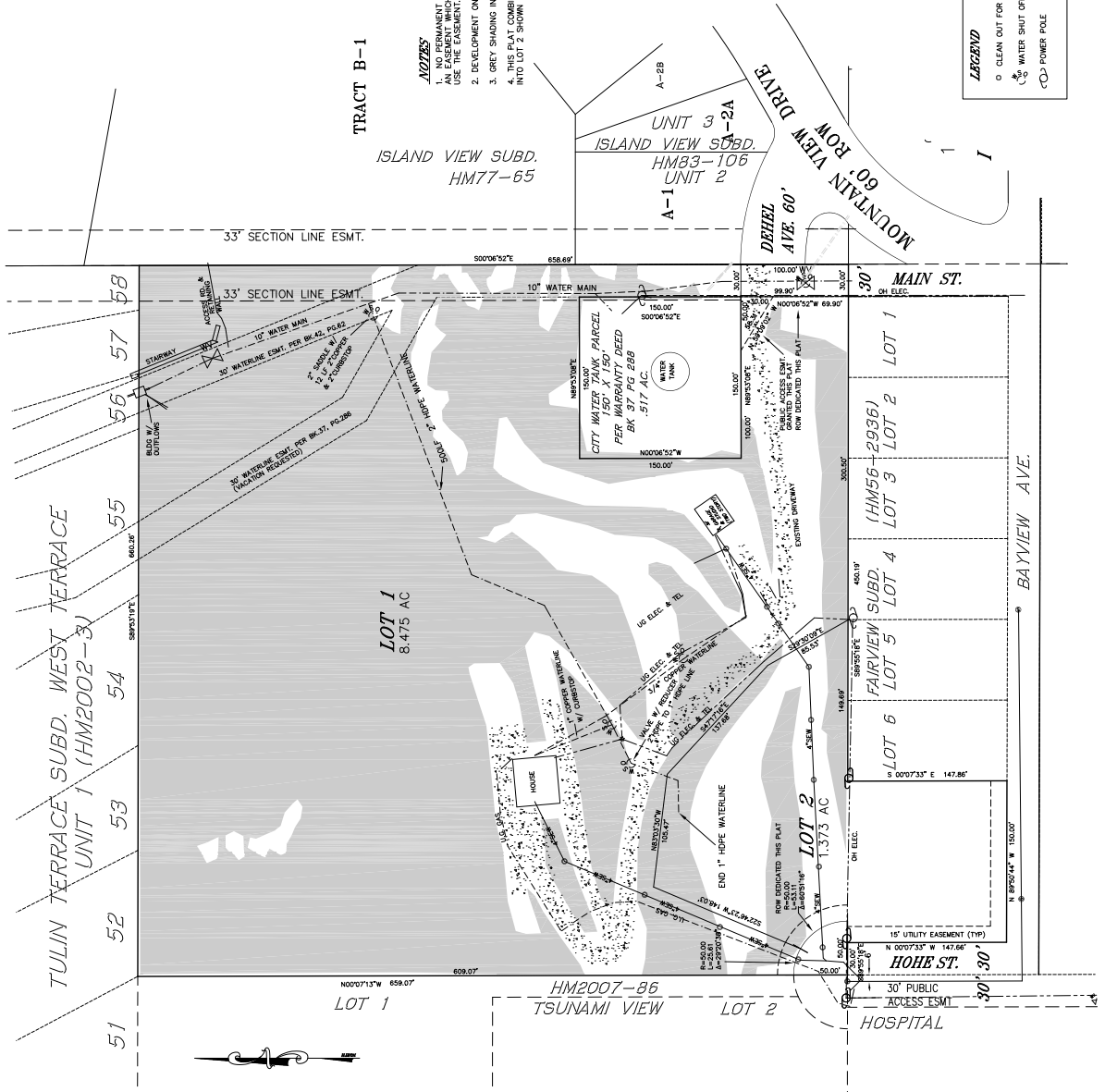
Notary Public for Alaska
My Commission Expires

TRACT B-1

ISLAND VIEW SUBD.
HM77-65

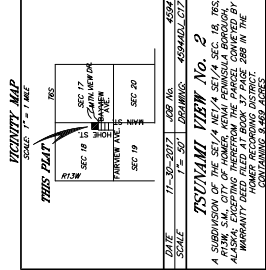
NOTES

1. NO PERMANENT STRUCTURE SHALL BE CONSTRUCTED OR PLACED WITHIN AN EASEMENT WHICH WOULD INTERFERE WITH THE ABILITY OF A UTILITY TO USE THE EASEMENT.
2. DEVELOPMENT ON THESE LOTS IS SUBJECT TO HOMER CITY CODE.
3. GREY SHADING INDICATES SLOPES 20 PERCENT AND STEEPER.
4. THIS PLAT COMBINES LOT 7A OF FAIRVIEW SUBDIVISION NENUS ADDITION INTO LOT 2 SHOWN HEREON.



PLAT APPROVAL
This plat was approved by the local Peninsula Borough Planning Commission meeting of _____ BY _____ Authorized Official

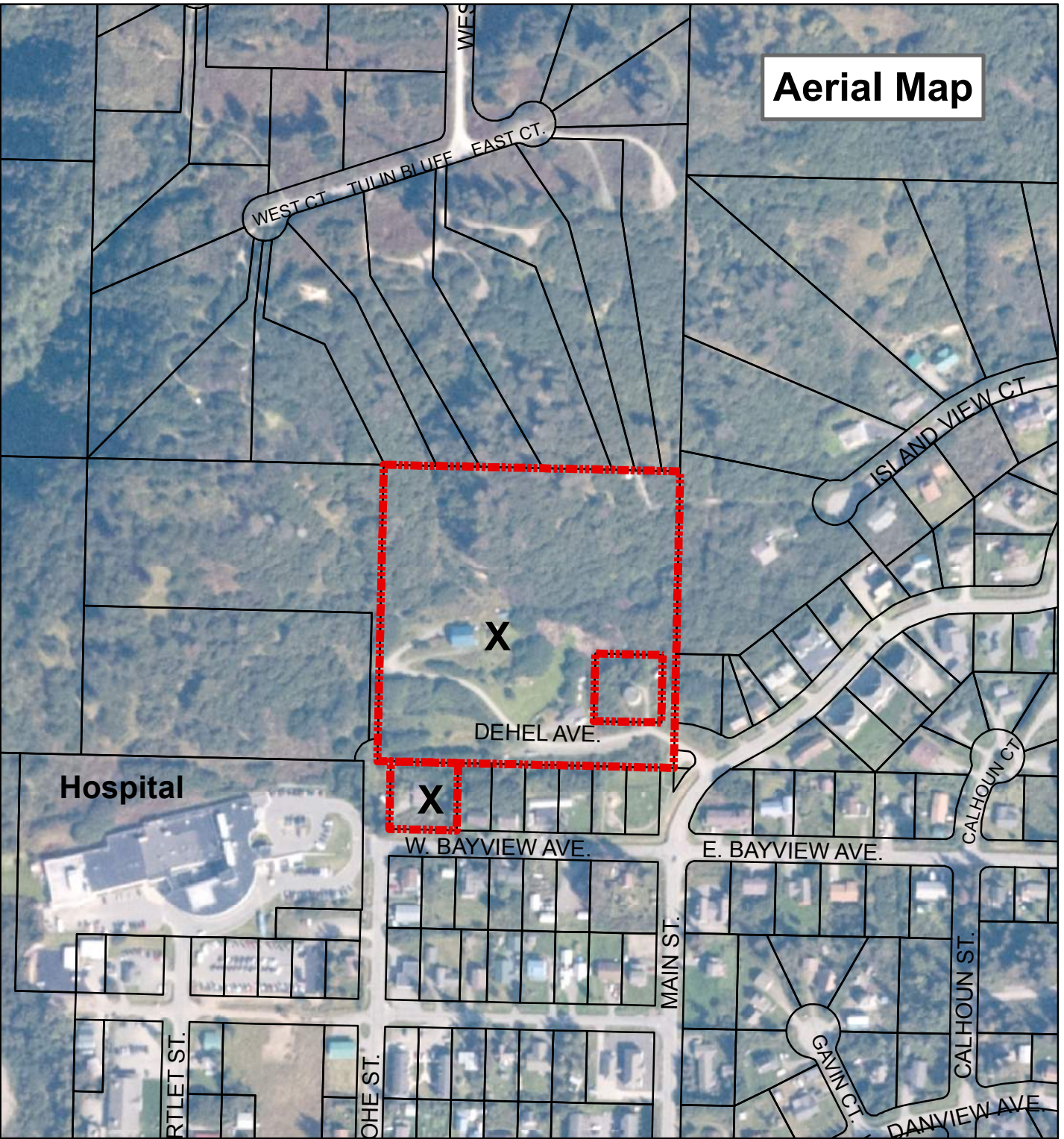
LEGEND
O CLEAN CUT FOR SOWER LINE
W WATER SHUT OFF VALVE
C POWER POLE



PLAT #
Rec Date
Date
Time

OWNER'S
GARY D. NELSON & STACEY R. NELSON
1520 W. BAYVIEW AVE.
HOMER, AK 99603
ROBERT D. NELSON & BETHANE M. NELSON
210 W. BAYVIEW AVE.
HOMER, AK 99603

APR FILE No. 2017-



Aerial Map



City of Homer
Planning and Zoning Department
 December 28, 2017

Tsunami View No 2 Preliminary Plat

0 250 500
 Feet



Disclaimer:
 It is expressly understood the City of
 Homer, its council, board,
 departments, employees and agents are
 not responsible for any errors or omissions
 contained herein, or deductions, interpretations
 or conclusions drawn therefrom.



City of Homer

www.cityofhomer-ak.gov

Planning

491 East Pioneer Avenue
Homer, Alaska 99603

Planning@ci.homer.ak.us

(p) 907-235-3106

(f) 907-235-3118

Staff Report 18-03

TO: Homer Advisory Planning Commission
FROM: Travis Brown, Planning Technician
THROUGH: Rick Abboud, City Planner
DATE: January 3, 2018
SUBJECT: J. Waddell Survey Dierich Addition Lot 4B-3A 2018 Replat

Requested Action: Recommend approval of this preliminary plat to the Kenai Peninsula Borough.

General Information:

Applicants:	Kenai Peninsula Housing Initiatives Inc. PO Box 1869 Homer, AK 99603	Seabright Survey + Design Kenton T. Bloom, P.L.S. 1044 East End Road, Ste. A Homer, AK 99603
Location:	0.5 mile East End Road at Ronda Street, near Mattox Road	
Parcel ID:	17903085	
Size of Existing Lot(s):	1.37 acres	
Size of Proposed Lots(s):	0.40 acres, 0.43 acres, & 0.54 acres	
Zoning Designation:	Residential Office District	
Existing Land Use:	Vacant	
Surrounding Land Use:	North: Vacant South: Mobile Home Park East: Vacant West: Dog grooming business & single family home	
Comprehensive Plan:	Chapter 4 "Land Use," Goal 5 "Maintain high quality residential neighborhoods; promote housing choice by supporting a variety of dwelling options." Proposed lot configuration may lend to	
Wetland Status:	Wetland Determination indicates no wetlands	
Flood Plain Status:	Zone D, Flood Hazards Undetermined	
BCWPD:	Not within the Bridge Creek Watershed Protection District.	
Utilities:	City water and sewer are available	
Public Notice:	Notice was sent to 29 property owners of 30 parcels as shown on the KPB tax assessor rolls.	

Analysis: This subdivision is within the Residential Office District. It splits one larger lot into three lots of roughly a half-acre each. An office building is currently under construction on the southernmost lot and is depicted on the plat. According to an Army Corps of Engineers wetland determination dated August 8, 2017, the entire property is free of wetlands.

Homer City Code 22.10.051 Easements and rights-of-way

- A. The subdivider shall dedicate in each lot of a new subdivision a 15-foot-wide utility easement immediately adjacent to the entire length of the boundary between the lot and each existing or proposed street right-of-way.

Staff Response: The plat meets these requirements.

- B. The subdivider shall dedicate in each lot of a new subdivision any water and/or sewer easements that are needed for future water and sewer mains shown on the official Water/Sewer Master Plan approved by the Council.

Staff Response: The plat meets these requirements.

- C. The subdivider shall dedicate easements or rights-of-way for sidewalks, bicycle paths or other non-motorized transportation facilities in areas identified as public access corridors in the Homer Non-Motorized Transportation and Trail Plan, other plans adopted by the City Council, or as required by the Kenai Peninsula Borough Code.

Staff Response: The plat meets these requirements.

Preliminary Approval, per KPB code 20.25.070 Form and contents required. The commission will consider a plat for preliminary approval if it contains the following information at the time it is presented and is drawn to a scale of sufficient size to be clearly legible.

- A. Within the Title Block:
 - 1. Names of the subdivision which shall not be the same as an existing city, town, tract or subdivision of land in the borough, of which a plat has been previously recorded, or so nearly the same as to mislead the public or cause confusion;
 - 2. Legal description, location, date, and total area in acres of the proposed subdivision; and
 - 3. Name and address of owner(s), as shown on the KPB records and the certificate to plat, and registered land surveyor;

Staff Response: The plat meets these requirements.

- B. North point;

Staff Response: The plat meets these requirements.

- C. The location, width and name of existing or platted streets and public ways, railroad rights-of-way and other important features such as section lines or political subdivisions or municipal corporation boundaries abutting the subdivision;

Staff Response: The plat meets these requirements.

- D. A vicinity map, drawn to scale showing location of proposed subdivision, north arrow if different from plat orientation, township and range, section lines, roads, political

boundaries and prominent natural and manmade features, such as shorelines or streams;

Staff Response: The plat meets these requirements.

- E. All parcels of land including those intended for private ownership and those to be dedicated for public use or reserved in the deeds for the use of all property owners in the proposed subdivision, together with the purposes, conditions or limitation of reservations that could affect the subdivision;

Staff Response: The plat meets these requirements.

- F. The names and widths of public streets and alleys and easements, existing and proposed, within the subdivision; [Additional City of Homer HAPC policy: Drainage easements are normally thirty feet in width centered on the drainage. Final width of the easement will depend on the ability to access the drainage with heavy equipment. An alphabetical list of street names is available from City Hall.]

Staff Response: The plat does not meet these requirements. See comments by Public Works below.

- G. Status of adjacent lands, including names of subdivisions, lot lines, lock numbers, lot numbers, rights-of-way; or an indication that the adjacent land is not subdivided;

Staff Response: The plat meets these requirements.

- H. Approximate location of areas subject to inundation, flooding or storm water overflow, the line of ordinary high water, wetlands when adjacent to lakes or non-tidal streams, and the appropriate study which identifies a floodplain, if applicable;

Staff Response: The plat meets these requirements. The existing lot does not contain any wetlands according to the Army Corps of Engineers Permit POA 2012-885, dated August 8, 2017.

- I. Approximate locations of areas subject to tidal inundation and the mean high water line;

Staff Response: The plat meets these requirements.

- J. Block and lot numbering per KPB 20.60.140, approximate dimensions and total numbers of proposed lots;

Staff Response: The plat meets these requirements.

- K. Within the limits of incorporated cities, the approximate location of known existing municipal wastewater and water mains, and other utilities within the subdivision and immediately abutting thereto or a statement from the city indicating which services are currently in place and available to each lot in the subdivision;

Staff Response: The plat meets these requirements. See comments by Public Works below.

- L. Contours at suitable intervals when any roads are to be dedicated unless the planning director or commission finds evidence that road grades will not exceed 6 percent on arterial streets, and 10 percent on other streets;

Staff Response: The plat meets these requirements.

- M. Approximate locations of slopes over 20 percent in grade and if contours are shown, the areas of the contours that exceed 20 percent grade shall be clearly labeled as such;

Staff Response: The plat meets these requirements.

- N. Apparent encroachments, with statement indicating how the encroachments will be resolved prior to final plat approval; and

Staff Response: The plat meets these requirements.

- O. If the subdivision will be finalized in phases, all dedications for through streets as required by KPB 20.30.030 must be included in the first phase.

Staff Response: The plat meets these requirements.

Public Works Comments:

1. Provide a conventional 20' radius return at the intersection of East End Road and Ronda Street and Ronda Street and Nelson Ave. Reflect this in the 15' utility easement and 20' building set back lines.
2. At this time, it is anticipated that water and sewer improvements serving the northern two proposed lots (4B-3A-2 and 4B-3A-3) will be constructed in the winter of 2018 as part of the Quiet Creek Park Subdivision. Road improvements are anticipated to be completed mid-summer 2018. These improvements will provide the necessary water and sewer mains and road improvements that are required for this subdivision. The subdivision agreement for the Quiet Creek Subdivision includes constructing road, water, and sewer improvements within the Ronda Street and Nelson Ave rights-of-way. The Quiet Creek plat cannot be recorded until all improvements are complete. This plat cannot be recorded until the water, sewer and road fronting these properties is completed and accepted by the City. Should the developer of this subdivision need to record prior to completion of the fronting improvements, a subdivision agreement would be necessary (including some sort of performance guaranty).

Fire Department Comments: No issues.

Staff Recommendation:

Planning Commission recommend approval of the preliminary plat with the following comments:

1. Provide a 20' radius return at the intersection of East End Road and Ronda Street and Ronda Street and Nelson Avenue. Reflect this in the 15' utility easement and 20' building set back lines.
2. This plat cannot be recorded until the water, sewer and road fronting these properties (as part of the Quiet Creek Park Subdivision) is completed and accepted by the City. Should the developer of this subdivision need to record prior to completion of the fronting improvements, a subdivision agreement would be necessary (including some sort of performance guaranty).

Attachments:

1. Preliminary Plat
2. Public Notice
3. Aerial Map

S 1/16 COR
S16 & S17
3.25" AC
2087-S 1978

N 86°45'42" W 440.02' (F)
N 86°45'20" W 439.77' (R)

LEGEND

- FIND 5/8" REBAR
- FIND 2" AL-CAP 5780-S 2006
- 2" AC (7968-S 2016) ON 5/8" REBAR SET THIS SURVEY
- ⊙ PRIMARY MONUMENT AS NOTED

DIERICH ADDN. NO. 3
LOT 1-A
HM 0910039

NOTES

1. NO PERMANENT STRUCTURES SHALL BE CONSTRUCTED OR PLACED WITHIN A UTILITY EASEMENT WHICH WOULD INTERFERE WITH THE ABILITY OF A UTILITY TO USE SAID EASEMENT.
2. THIS SUBDIVISION IS SUBJECT TO THE ZONING REGULATIONS OF THE CITY OF HOMER.
3. THIS LOT IS SERVED BY CITY OF HOMER WATER AND SEWER.
4. THE 15' FT FRONTING THE RIGHT-OF-WAY AND THE FRONT 20' WITHIN 5' OF THE SIDE LOT LINES IS A UTILITY EASEMENT.

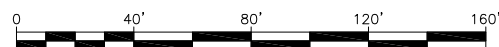
NOTARY'S ACKNOWLEDGMENT

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____
DAY OF _____, 2018.

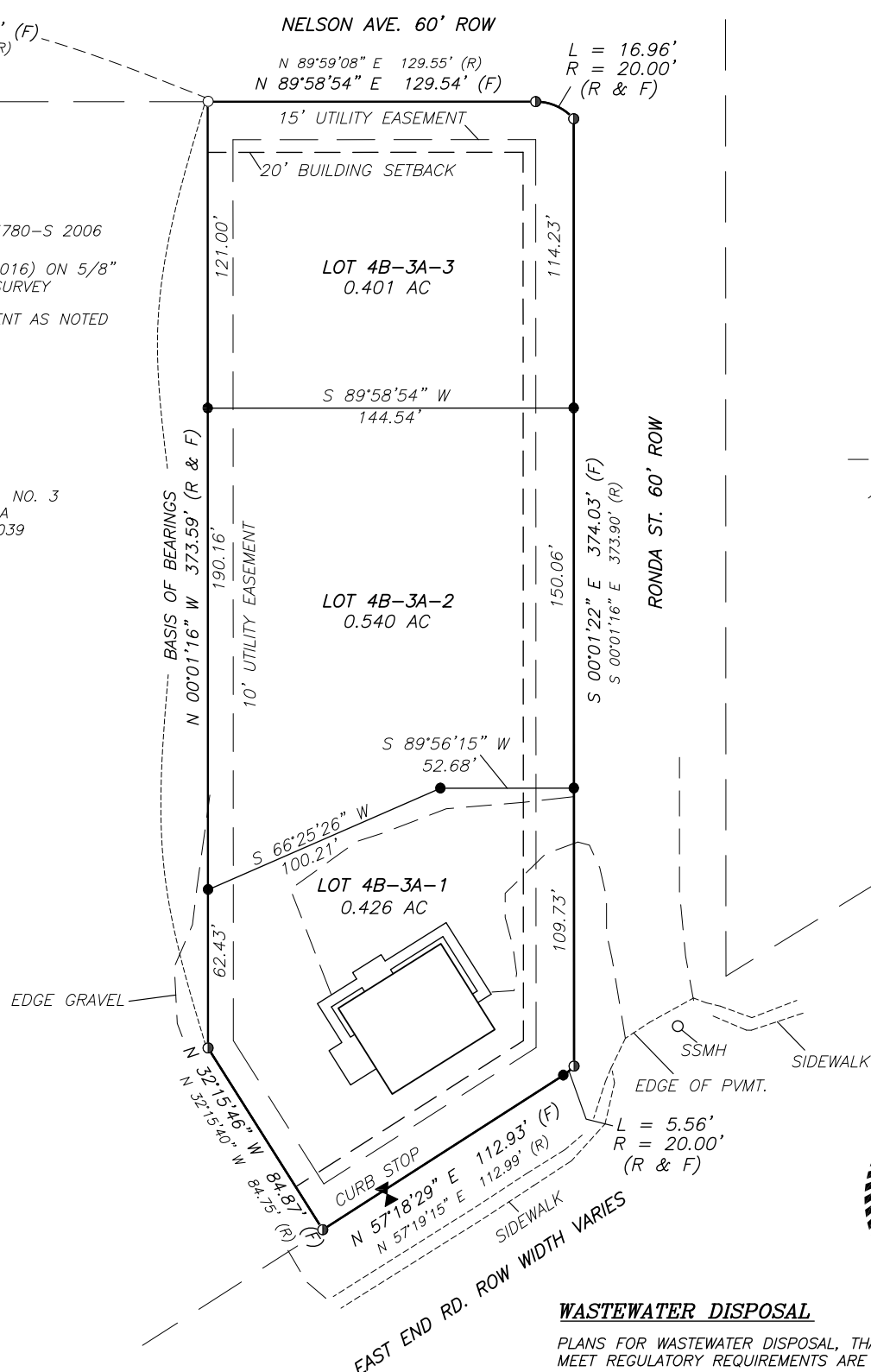
FOR: _____

NOTARY PUBLIC FOR ALASKA

MY COMMISSION EXPIRES _____

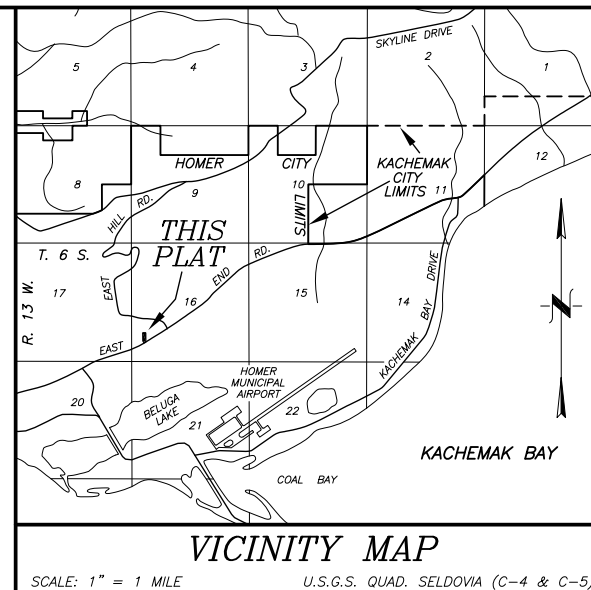


GRAPHIC SCALE



WASTEWATER DISPOSAL

PLANS FOR WASTEWATER DISPOSAL, THAT MEET REGULATORY REQUIREMENTS ARE ON FILE AT THE ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION.



CERTIFICATE OF OWNERSHIP

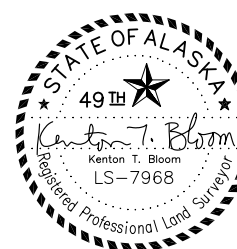
I HEREBY CERTIFY THAT I AM THE OWNER OF THE REAL PROPERTY SHOWN AND DESCRIBED HEREON, THAT I HEREBY ADOPT THIS PLAN OF SUBDIVISION, AND BY MY FREE CONSENT DEDICATE ALL RIGHTS OF WAY AND PUBLIC AREAS TO PUBLIC USE, AND GRANT ALL EASEMENTS TO THE USE SHOWN HEREON.

XXXXX, SIGNOR
KENAI PENINSULA HOUSING INITIATIVES INC
P.O. BOX 1869
HOMER, AK 99603

PLAT APPROVAL

THIS PLAT WAS APPROVED BY THE KENAI PENINSULA BOROUGH PLANNING COMMISSION AT THE MEETING OF _____
KENAI PENINSULA BOROUGH

BY: _____
AUTHORIZED OFFICIAL



J. WADDELL SURVEY DIERICH ADDITION LOT 4B-3A 2018 REPLAT

A SUBDIVISION OF LOT 4B-3A OF THE
J. WADDELL SURVEY DIERICH ADDITION HM 20060084
LOCATED WITHIN THE SW 1/4 OF SECTION 16
TWP. 6 SOUTH RING. 13 WEST, S.M.
AND WITHIN THE CITY OF HOMER, ALASKA
CONTAINING 1.367 ACRES +/-

SEABRIGHT SURVEY + DESIGN KENTON T. BLOOM, P.L.S.

1044 EAST ROAD, SUITE A
HOMER, ALASKA 99603
(907) 235-4247

CLIENT: KENAI PENINSULA HOUSING INITIATIVES INC.
P.O. BOX 1869 HOMER, AK

DRAWN BY: KB	CHKD BY: KB	JOB #2017-24
DATE: 5/2017	SCALE: 1"=40'	SHEET #1 OF 1

NOTICE OF SUBDIVISION

Public notice is hereby given that a preliminary plat has been received proposing to subdivide or replat property. You are being sent this notice because you are an affected property owner within 500 feet of a proposed subdivision and are invited to comment.

Proposed subdivision under consideration is described as follows:

J. Waddell Survey Dierich Addition Lot 4B-3A 2018 Replat Preliminary Plat

The location of the proposed subdivision affecting you is provided on the attached map. A preliminary plat showing the proposed subdivision may be viewed at the City of Homer Planning and Zoning Office. Subdivision reviews are conducted in accordance with the City of Homer Subdivision Ordinance and the Kenai Peninsula Borough Subdivision Ordinance. A copy of the Ordinance is available from the Planning and Zoning Office. **Comments should be guided by the requirements of those Ordinances.**

A public meeting will be held by the Homer Advisory Planning Commission on Wednesday, January 03, 2018 at 6:30 p.m. at Homer City Hall, Cowles Council Chambers, 491 East Pioneer Avenue, Homer, Alaska.

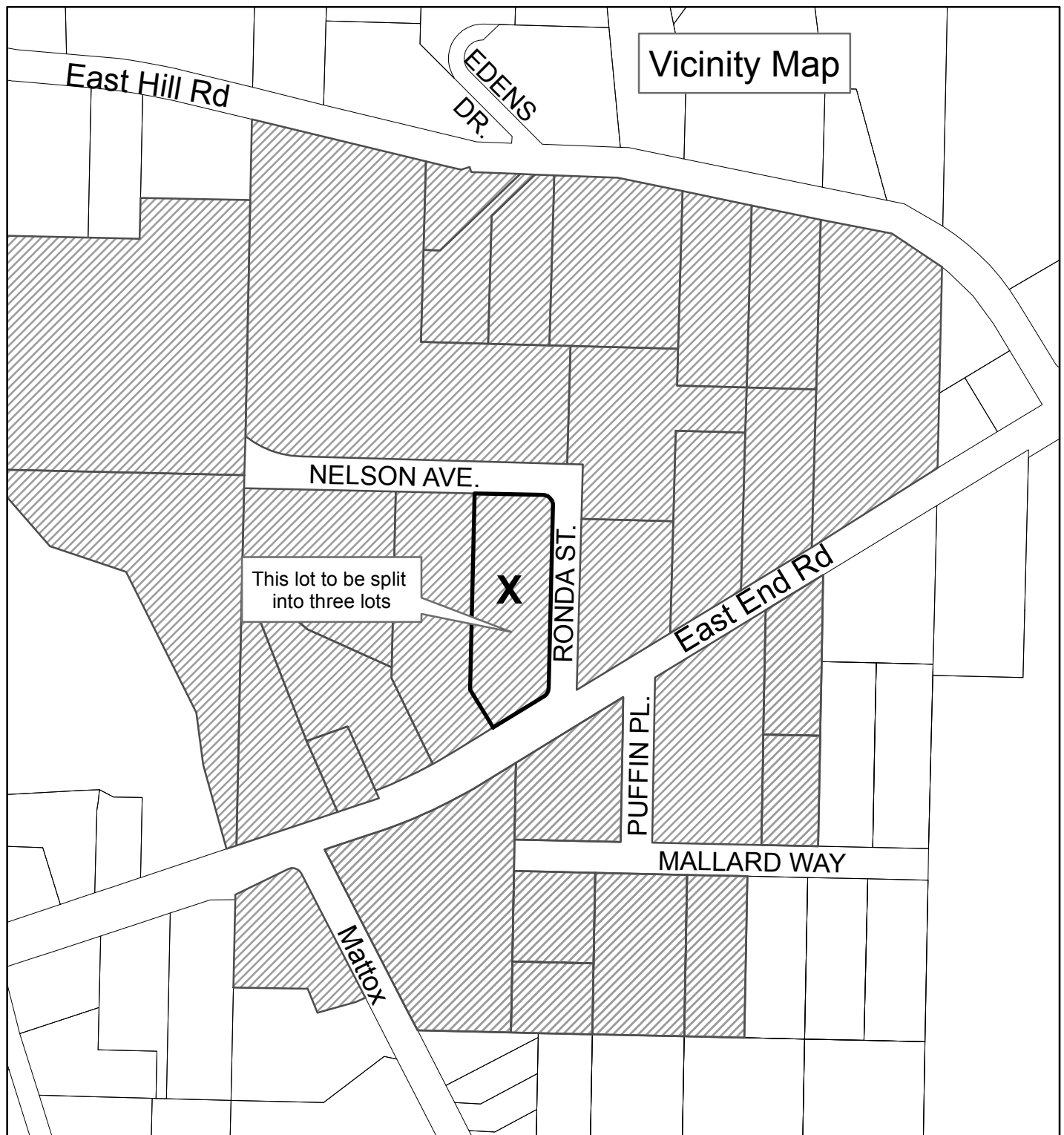
Anyone wishing to present testimony concerning this matter may do so at the meeting or by submitting a written statement to the Homer Advisory Planning Commission, 491 East Pioneer Avenue, Homer, Alaska 99603, by 4:00 p.m. on the day of the meeting.

The complete proposal is available for review at the City of Homer Planning and Zoning Office located at Homer City Hall. For additional information, please contact Rick Abboud in the Planning and Zoning Office, 235-3106.

NOTICE TO BE SENT TO PROPERTY OWNERS WITHIN 500 FEET OF PROPERTY.

.....

VICINITY MAP ON REVERSE



City of Homer
Planning and Zoning Department

December 18, 2017

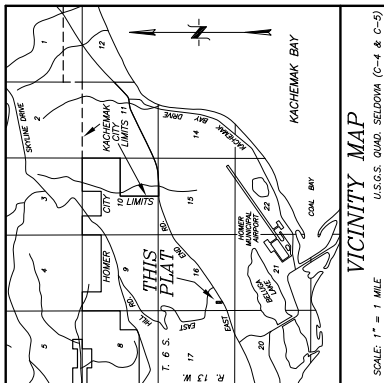
J. Waddell Survey Dierich Addition Lot 4B-3A 2018 Replat Preliminary Plat

Marked lots are within 500 feet
and property owners notified.

0 250 500
Feet



Disclaimer:
It is expressly understood the City of
Homer, its council, board,
departments, employees and agents are
not responsible for any errors or omissions
contained herein, or deductions, interpretations
or conclusions drawn therefrom.



CERTIFICATE OF OWNERSHIP

I HEREBY CERTIFY THAT I AM THE OWNER OF THE REAL PROPERTY SHOWN AND DESCRIBED HEREON, THAT I HEREBY ADOPT THIS PLAN OF SUBDIVISION, AND BY MY FREE CONSENT DEDICATE, ALL RIGHTS OF WAY, EASEMENTS, AND OTHER INTERESTS, AND GRANT ALL EASEMENTS TO THE USE SHOWN HEREON.

XXXXX, SIGNOR
KENAI PENINSULA HOUSING INITIATIVES INC
P.O. BOX 1869 HOMER, AK 99603

PLAT APPROVAL

THIS PLAT WAS APPROVED BY THE KENAI PENINSULA BOROUGH PLANNING COMMISSION AT THE MEETING OF _____
KENAI PENINSULA BOROUGH

BY: _____
AUTHORIZED OFFICIAL

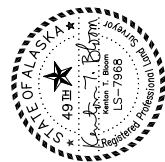
**J. WADDELL SURVEY
DIERICH ADDITION LOT 4B-3A
2018 REPLAT**

A SUBDIVISION OF LOT 4B-3A OF THE
J. WADDELL SURVEY DIERICH ADDITION HM 20060084
LOCATED WITHIN THE SW 1/4 OF SECTION 16
TWP. 6 SOUTH RANG. 13 WEST, S.M.
AND CONTAINING 1.367 ACRES +/-

SEABRIGHT SURVEY + DESIGN
KENTON T. BLOOM, P.L.S.
1044 EAST ROAD, SUITE A
HOMER, ALASKA 99603
(907) 235-4247

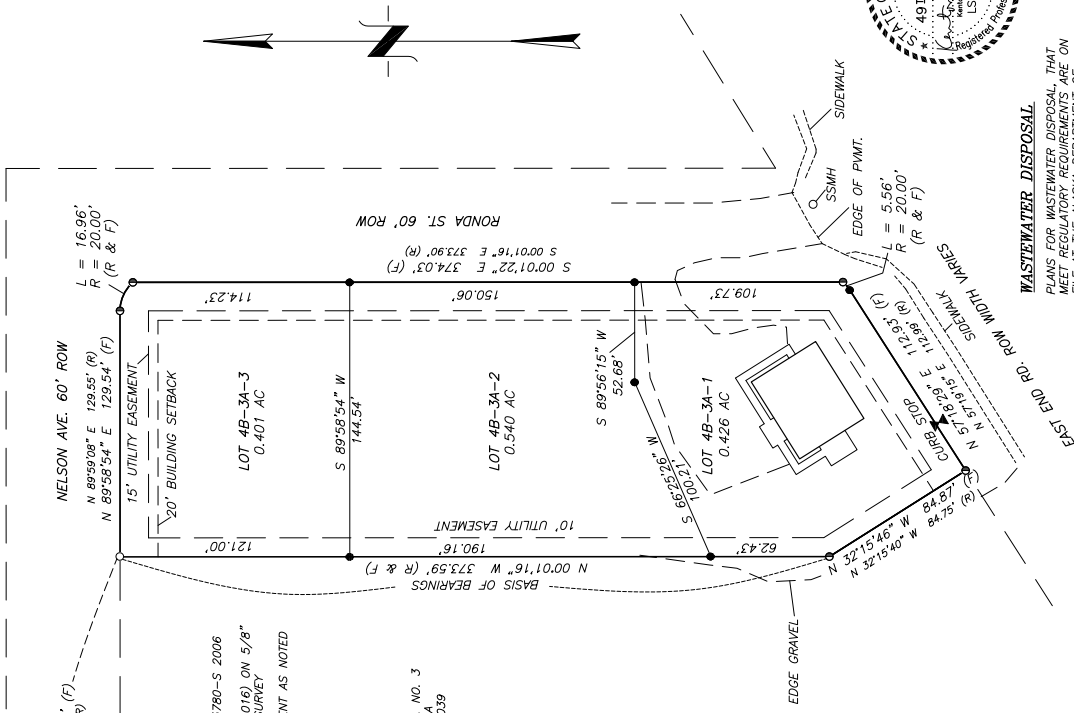
CLIENT: KENAI PENINSULA HOUSING INITIATIVES INC.
P.O. BOX 1869 HOMER, AK

DRAWN BY: KB	CHKD BY: KB	JOB #2017-24
DATE: 5/2017	SCALE: 1"=40'	SHEET #1 OF 1



WASTEWATER DISPOSAL

PLANS FOR WASTEWATER DISPOSAL, THAT MEET REGULATORY REQUIREMENTS ARE ON FILE WITH THE DEPARTMENT OF ENVIRONMENTAL CONSERVATION.



NOTARY'S ACKNOWLEDGMENT

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____ DAY OF _____, 2018.

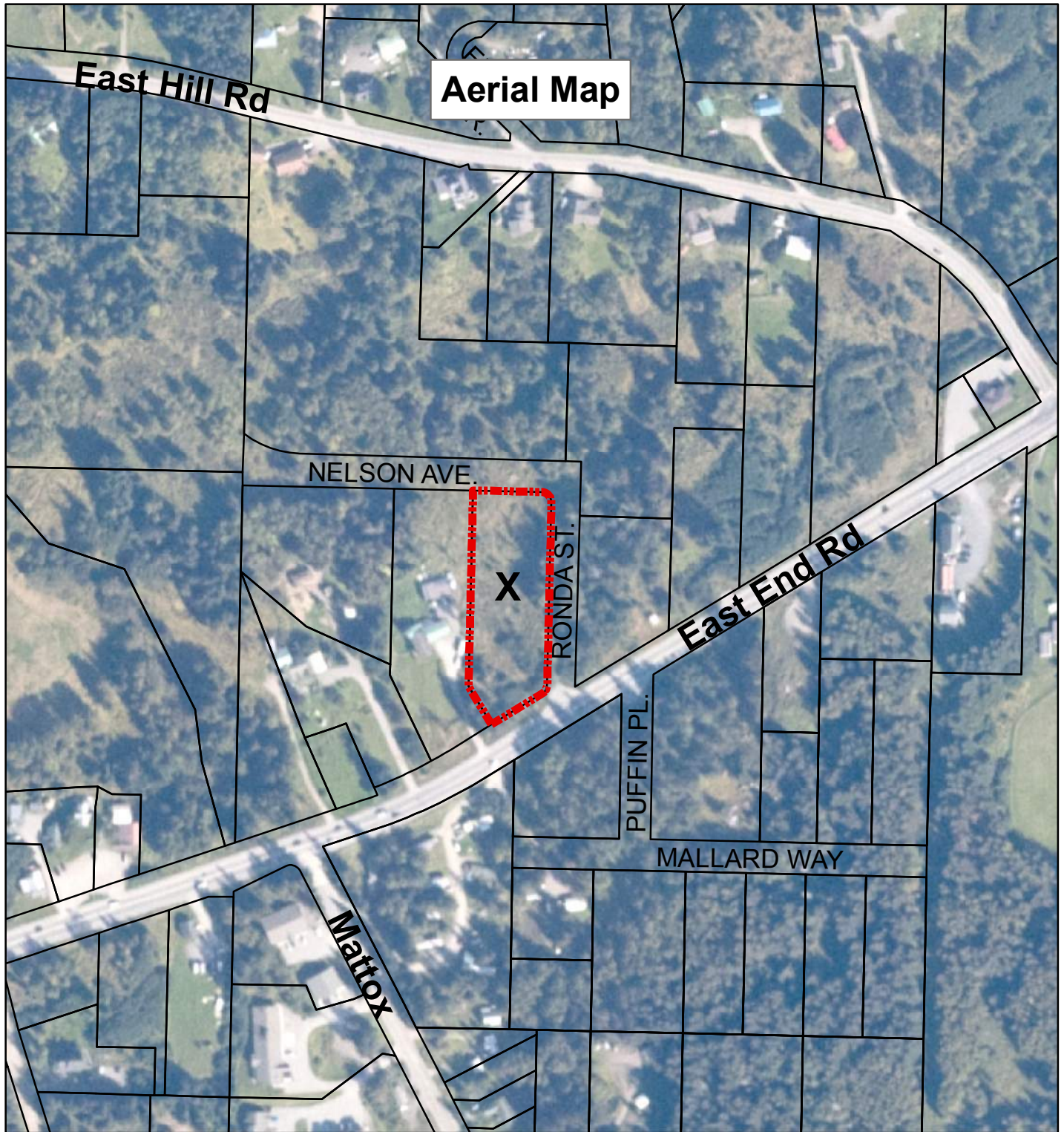
FOR: _____

NOTARY PUBLIC FOR ALASKA

MY COMMISSION EXPIRES _____



GRAPHIC SCALE



City of Homer
Planning and Zoning Department

December 28, 2017

**J. Waddell Survey Dierich
Addition Lot 4B-3A 2018 Replat
Preliminary Plat**

0 250 500
Feet



*Disclaimer:
It is expressly understood the City of
Homer, its council, board,
departments, employees and agents are
not responsible for any errors or omissions
contained herein, or deductions, interpretations
or conclusions drawn therefrom.*



City of Homer

www.cityofhomer-ak.gov

Planning

491 East Pioneer Avenue
Homer, Alaska 99603

Planning@ci.homer.ak.us

(p) 907-235-3106

(f) 907-235-3118

Staff Report PL 18-04

TO: Homer Advisory Planning Commission
FROM: Rick Abboud, City Planner
DATE: January 3, 2018
SUBJECT: Election of Officers

Introduction

The Planning Commission bylaws state that elections for Chairman and Vice-Chairman shall be held annually, in August (we missed this and will do it now). Typically, the chair opens the floor for nominations for chair, and the Commission makes one or more nominations. The vote can be by roll call, or by secret ballot. The process is repeated for vice chair.

Staff Comments:

Staff recommends the Planning Commissions conduct elections for Chair and Vice-Chair.



City of Homer

www.cityofhomer-ak.gov

Planning

491 East Pioneer Avenue
Homer, Alaska 99603

Planning@ci.homer.ak.us

(p) 907-235-3106

(f) 907-235-3118

Staff Report PL 18-05

TO: Homer Advisory Planning Commission
FROM: Rick Abboud, City Planner
DATE: January 3, 2017
SUBJECT: Natural Hazards Planning

Introduction

The City Council has passed a resolution that directs the Planning Commission to evaluate and make recommendations in order to zoning regulations that may reduce the risks associated with unstable slopes in and around the Baycrest Subdivision.

The Baycrest Subdivision is located off the Sterling Highway at the intersection of Mount Augustine Drive. Some structures located on Judy Rebecca Court have experienced movement and have been secured by cabling. Many suggestions have been made for the movement. These range from ground disturbances caused by right-of-way clearing, gas line installation, and water from a culvert under the highway. It does seem apparent that the area is plagued by poor soil conditions and slopes which creates less than ideal conditions to support developments.

Analysis

While there are many recommendations to address such conditions, several are unviable due to the fact that the land has already been subdivided and partially developed. I have been attempting to reach out to communities such as Sitka, which has recent experience with landslides and has passed an ordinance addressing developments, and to the state in regards to the current mitigation actions associated with our all hazards mapping. Due to the holidays, many key contacts are not available till after the New Year.

I am attaching the first few chapters of a Planning Advisory Service article on landslide hazards. This will provide you with a comprehensive background of science behind landslides and a relatively comprehensive list of actions that can be taken to address the hazard. My two areas of focus, at this time, are opportunities for the use of hazard mitigation grant funding and the analysis of appropriate regulations for development. I will contact the state regarding hazard mitigation opportunities. I will also research the opportunities for regulations which I believe will generally start with identification of the hazard area.

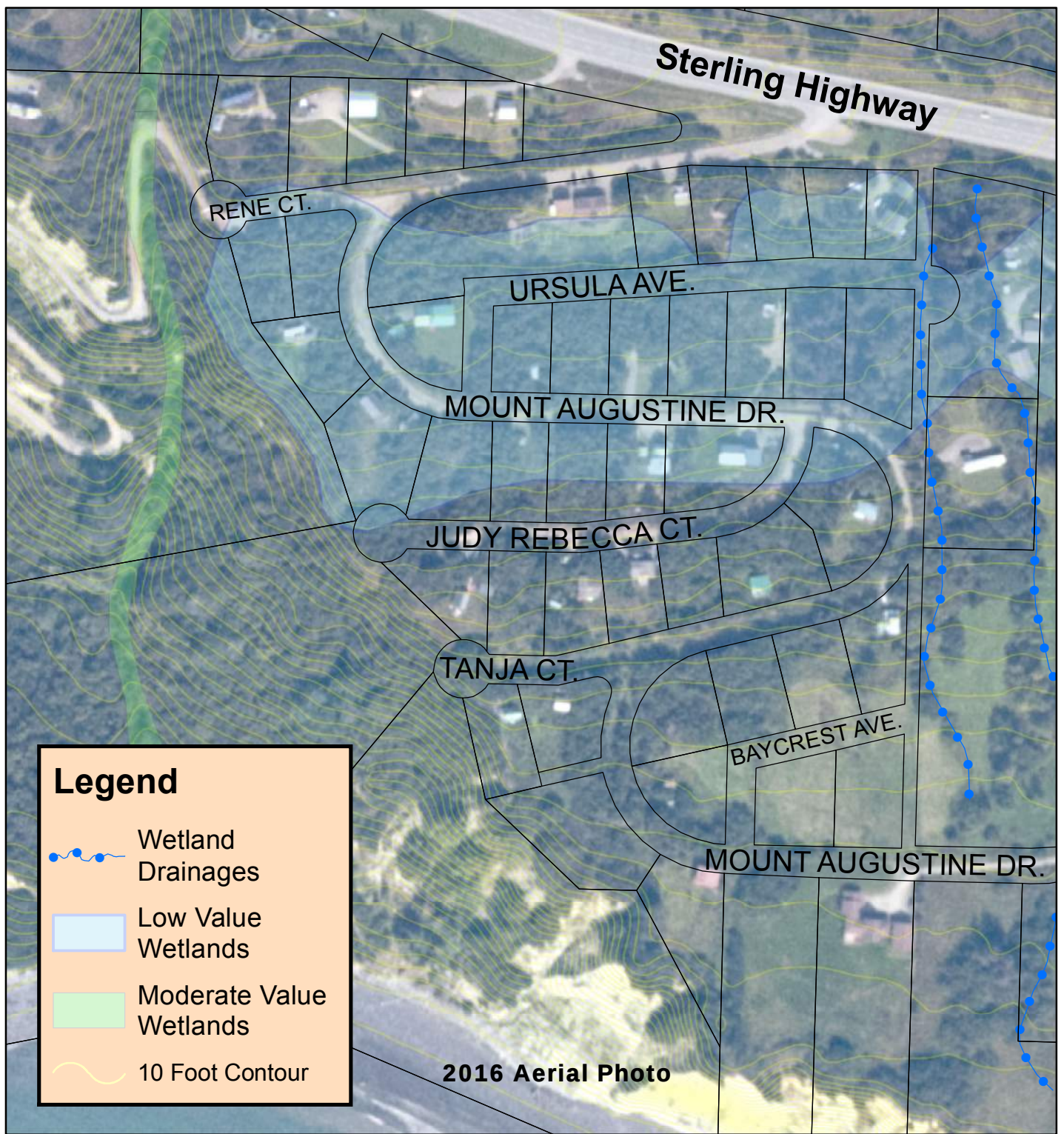
I plan on examining the various means and measures presented in the report as we are able to better define the hazard and hazard areas.

Staff Recommendation

Review information.

Attachments

1. Aerial Map
2. Reso 17-082
3. Landslide Hazards and Planning Chapters 1-3



City of Homer
Planning and Zoning Department

December 28, 2017

Mount Augustine Drive Area Map



Disclaimer:
It is expressly understood the City of Homer, its council, board, departments, employees and agents are not responsible for any errors or omissions contained herein, or deductions, interpretations or conclusions drawn therefrom.

**CITY OF HOMER
HOMER, ALASKA**

Erickson

RESOLUTION 17-082

A RESOLUTION OF THE CITY COUNCIL OF HOMER, ALASKA,
DIRECTING THE HOMER ADVISORY PLANNING COMMISSION TO
CONSIDER A NATURAL HAZARDS OVERLAY DISTRICT OR OTHER
APPROPRIATE ZONING REGULATIONS IN AND AROUND THE
BAYCREST SUBDIVISION.

WHEREAS, The Homer City Council recognizes the threat that natural and human
generated hazards pose to its residents, their property, public infrastructure, and the health
and safety of the community at large; and

WHEREAS, Planning for and implementing actions that avoid or mitigate the impacts of
hazards before disasters occur reduces the potential for harm to people and property and
saves taxpayer dollars; and

WHEREAS, Locations in and near the Baycrest Subdivision have been identified to be
affected by active unstable slopes; and

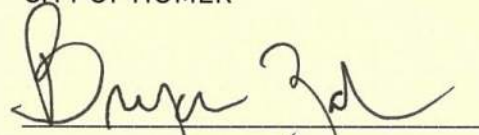
WHEREAS, The Homer Advisory Planning Commission shall evaluate and make
recommendations to the City Council regarding amendments to Title 21; and

WHEREAS, The Homer Advisory Planning Commission may need to retain the services
of a Geotechnical Professional for specific recommendations.

NOW, THEREFORE, BE IT RESOLVED that the Homer City Council hereby directs the
Homer Advisory Planning Commission to consider zoning regulations that may reduce the risks
associated with unstable slopes in and around the Baycrest Subdivision.

PASSED AND ADOPTED by the Homer City Council this 25th day of September, 2017.

CITY OF HOMER


BRYAN ZAK, MAYOR

43 ATTEST:

44

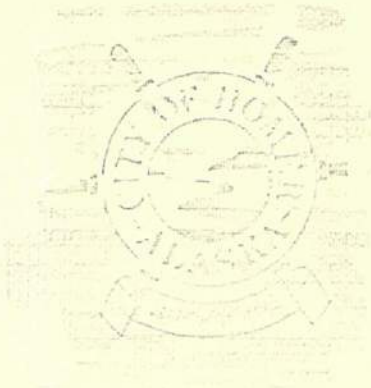
45 Melissa Jacobsen

46 MELISSA JACOBSEN, MMC, CITY CLERK

48

49 Fiscal Note: Geotechnical Professional Services cost TBD

50



Landslide Hazards and Planning



James C. Schwab, Paula L. Gori, and Sanjay Jeer, Project Editors



American Planning Association



Planning Advisory Service
Report Number 533/534



James C. Schwab, AICP, is a Senior Research Associate for the American Planning Association (APA) and the coeditor of *Zoning Practice*. He is the author or coauthor of six PAS Reports, including PAS Report 483/484, *Planning for Post-Disaster Recovery and Reconstruction* and 529/530, *Planning for Wildfires*.

Sanjay Jeer, AICP, was formerly a senior research associate for APA focusing in areas of land-use planning, environmental regulation, and computer applications for planning and research. He served as the principal investigator for the Land-Based Classification Standards (LBCS) project.

Paula Gori is the Associate Coordinator of the Landslide Hazard Program at the U.S. Geological Survey. Her primary mission with USGS is to encourage other federal agencies, state and local governments, and the private sector to use geologic hazards information to reduce losses through informed natural hazard management. She is the author of numerous articles, including "The Social Dynamics of a False Earthquake Prediction and the Response by the Public Sector," which documents the response to the Iben Browning Prediction in 1990 and was published in the *Bulletin of the Seismological Society of America*.

This PAS Report was prepared with funding from USGS and APA. The views and opinions expressed herein are those of the authors and do not necessarily reflect those of either USGS or APA.

Cover design by Lisa Barton; this report is printed on recyclable paper.

Cover photo: The very graphic results of a landslide in La Conchita, California, in early 2005; photo by Jonathan Godt.

The Planning Advisory Service is a subscription service offered by the Research Department of the American Planning Association. Eight reports are produced each year. Subscribers also receive the PAS Memo each month and have use of the Inquiry Answering Service. W. Paul Farmer, Executive Director; Sylvia Lewis, Publications Director; William Klein, Director of Research.

Planning Advisory Service Reports are produced in the Research Department of APA. James Hecimovich, Editor; Marya Morris, Assistant Editor; Lisa Barton, Design Associate; Rhonda Smith, Editorial Assistant.

© September 2005 by the American Planning Association.

APA's publications office is at 122 S. Michigan Ave., Suite 1600, Chicago, IL 60603.

E-mail: pasreports@planning.org

APA headquarters office is at 1776 Massachusetts Ave., N.W., Washington, DC 20036.

Landslide Hazards and Planning

JAMES C. SCHWAB, AICP, PAULA L. GORI, AND
SANJAY JEER, AICP, PROJECT EDITORS

TABLE OF CONTENTS

Foreword	iii
Chapter 1. A Primer on Landslide Hazards for Planners	1
The Nature of Landslide Hazards	2
Scope and Consequences	8
Key Planning Issues	14
Chapter 2. Planning to Address Landslide Hazards	17
Trends in Hazard Planning	18
Landslide Hazards and the Comprehensive Plan	18
Hazard Identification and Risk Management	21
Policy Responses	29
Chapter 3. Development Regulations for Landslide Hazards	39
Zoning and Landslide Mitigation	40
Use Restrictions	44
Grading Ordinances	52
Maintenance Requirements	55
Subdivision and Planned Unit Development Standards	55
Transfer of Development Rights	57
Bonds and Insurance	59
Hillside Development Ordinances	60
Chapter 4. Geologic Hazard Abatement Districts (GHADs)	61
California's Experience with Hazard Mitigation Through Geologic Hazard Abatement Districts	
<i>By Daniel J. Curtin, Jr. and Shawn J. Zovod</i>	<i>62</i>
Weighing the Benefits of GHADs	
<i>By Sanjay P. Jeer, AICP</i>	<i>69</i>
Chapter 5. Technical Tools to Assist Planners in Combating Landslide Hazards	75
New Quantitative Landslide Hazard Assessment Tools for Planners	
<i>By William C. Haneberg</i>	<i>76</i>
Growth, Geology, and GIS: Mapping, Modeling, and Living with Geologic Hazards in Moab–Spanish Valley, Grand County, Utah	
<i>By Mike Price</i>	<i>85</i>

Chapter 6. Case Studies: How Local Governments Respond to the Challenge of Planning for Landslide Hazards	95
A Model of Effective Use of Geology in Planning, Portola Valley, California	
<i>By George Mader, FAICP</i>	<i>96</i>
The Kelso, Washington, Aldercrest–Banyon Landslide	
<i>By Jane Preuss, Kenneth Buss, and Lois Lopez</i>	<i>113</i>
Policy Tools for Addressing Landslide Hazards in Pittsburgh, Pennsylvania	
<i>By David A. Hart, AICP</i>	<i>125</i>
The Green Mountain Landslide: A Case History of Geologic Hazards Planning in Colorado	
<i>By Karen A. Berry, AICP</i>	<i>131</i>
Chapter 7. State and Federal Roles in Landslide Hazard Planning and Mitigation	143
California’s Seismic Hazards Mapping Act: A Statewide Approach to Landslide Hazard Mitigation	
<i>By Charles R. Real</i>	<i>144</i>
Landslide Hazards and Federal Lands: The United States Department of Agriculture Forest Service Experience	
<i>By Jerome V. DeGraff</i>	<i>154</i>
The Role of Government in Landslide Hazards Loss Reduction with a Discussion of the Role of the United States Geological Survey and Other Federal Agencies	
<i>By Paula Gori and Lynn Highland</i>	<i>165</i>
Appendices	179
Appendix A: A Glossary of Landslide-Related Terms	179
Appendix B: Annotated Bibliography and References	185

Foreword

Landslides cause human suffering and death, billions of dollars in property losses, and significant environmental degradation yearly. As population and infrastructure become more concentrated, natural disasters that strike population centers will have a magnified impact on human life and the economy. Although the number of natural disasters may not be larger than in the past, their impact on society and the economy has increased. Information about landslide hazards cannot by itself reduce the intensity of the events, it but can help to reduce their deleterious impact through better understanding of the risk, better public education and informed public policy, and more effective emergency response. The United States can reduce the increasingly high cost of landslides and other natural disasters through the use of earth science information.

Geologic information—about the land surface, what lies beneath it, and what processes shape the landscape—is needed to ensure safe and economically sound land use in all parts of the nation. The United States Geological Survey (USGS), the nation’s chief earth science federal agency, is committed to helping land-use planners and public officials effectively use geologic information as they develop and manage land. Communities can often significantly reduce their losses from natural disasters, including landslides, by making land-use decisions to mitigate these hazards while achieving environmental and other goals.

A key part of the USGS mission is to minimize loss of life and property from natural disasters. The Disaster Relief Act of 1977, known as the Stafford Act, assigns USGS responsibility to work to reduce losses from geologic hazards, including landslides, and to enhance public safety through effective forecasting and warnings based on good scientific information.

USGS works cooperatively with federal, state, and local agencies and the private sector to provide scientific information needed to ensure public safety and prosperity. In fact, an important goal of USGS is to nurture relationships with partners. USGS has a long tradition of partnership with the American Planning Association (APA) to raise the awareness and the ability of planners to deal with natural hazards. In 1981, APA, with USGS assistance, published two reports, *Reducing Landslide Hazards: A Guide for Planners* (Planning Advisory Service Report No. 359) and *Reducing Earthquake Risks: A Planner’s Guide* (Planning Advisory Service Report No. 364). USGS has long recognized the important role that planners play in reducing the effects of natural hazards, especially at the local level where most decisions about land development are made. For this reason, USGS is proud to partner with APA on producing this PAS Report. USGS is confident that planners will use the information in this report to make wise decisions that reduce the social and economic costs of landslides.

As planners, you have a unique opportunity to minimize the suffering and loss that natural hazards can inflict on your communities. This report provides a comprehensive guide to identifying hazards and the legal and administrative tools to deal with them. The report also gives numerous examples of how communities have successfully incorporated landslide hazard information into their planning process. Reducing exposure to natural hazards is crucial to the long-term health and vitality of communities and, therefore, should be considered as important as other traditional planning considerations. USGS looks forward to supporting and providing information to APA’s members and other land-use planners both in the United States and abroad to improve public health, public safety, and public prosperity.

P. Patrick Leahy
Acting Director
United States Geological Survey

Acknowledgments

This Planning Advisory Service Report was the ultimate product of an American Planning Association research project underwritten by the U.S. Geological Survey (USGS). This report, material on APA's website, and several conference sessions are the result of the collaboration between APA and USGS. Paula L. Gori served as the USGS project officer, working with Sanjay Jeer and James C. Schwab at APA throughout the development of the project.

Many people played important roles in the composition of this PAS Report and other materials that are the products of this project. We would like to thank them all for their various contributions.

First, we thank all the contributors of working papers and case studies, whose credentials are listed with their articles: Karen Berry, Ken Buss, Daniel Curtin, Jerome De Graff, Paula L. Gori, William C. Haneberg, David Hart, Lynn Highland, Lois Lopez, George Mader, Jane Preuss, Mike Price, Charles Real, and Shawn Zovod.

For reviewing the final drafts of this report, we thank Robert B. Olshansky, planning professor at the University of Illinois in Champaign, Gerald F. Wiczorek, a geological engineer with USGS in Menlo Park, California, and David K. Keefer, also with USGS.

Illustrations are always extremely important in a document dealing with natural hazards, and a number of organizations and individuals, aside from those cited above, were helpful in identifying appropriate maps, photographs, and drawings. These include: Joy Ikelman at the National Geophysical Data Center; Darren Beckstrand at NW Geoscience; and Jonathan W. Godt at USGS, who provided the cover photo.

Paula Gori and Lynn Highland are especially thankful to these individuals who helped prepare and review the article in Chapter 7 about federal involvement in landslide hazards:

- Ed Pasterick and Elizabeth Lemersal, Federal Emergency Management Agency (Department of Homeland Security);
- Robert Livezey, NOAA National Oceanographic and Atmospheric Administration (Department of Commerce);
- Lindsay McLelland, National Park Service;
- Gene Krueger, Office of Surface Mining, Reclamation, and Enforcement (Department of Interior);
- William Ypsilantis, Bureau of Land Management (Department of Interior);
- Jerome DeGraff, National Forest Service (Department of Agriculture);
- Lawson Smith, Army Corps of Engineers (Department of Defense);
- Barry Siel, Federal Highway Administration (Department of Transportation);
- Donald Plotkin, Federal Railroad Administration (U.S. Department of Transportation); and
- Richard J. Frigaszy, National Science Foundation.

Finally, we are grateful to those who participated in a symposium in an early phase of the project that helped to define the issues APA should address. These included several of the contributors cited above, Dan Sentz, Senior City Planner, City of Pittsburgh; and Eliot Spiker, Coordinator, Landslide Hazards and Earth Surface Dynamics Programs.

CHAPTER 1

A Primer on Landslide Hazards for Planners

Why should landslide hazards matter to planners? This report aims to answer that question as well as to describe where landslide concerns fit into the larger routine of the daily work planners do. Landslides do not often occur in complete isolation from other types of disasters but are typically part of a more complex set of natural processes whose impacts are sometimes exacerbated by human activities. Landslides are primarily associated with mountainous regions; they can also occur, however, in areas of generally low relief.

The purpose of this PAS Report is to show planners and others how they can help to minimize the risks to human life and property from landslides by guiding development appropriately.

In many communities, planners face a variety of natural and man-made hazards as they seek to shape and implement local policies and projects concerning land use and development. Some natural disasters, such as hurricanes and tornadoes, are weather-related; others, such as earthquakes, result from geological processes. The consequences of these disasters are clearly affected by human and technological factors. For example, impervious surfaces tend to accelerate the accumulation of floodwaters. The storage of flammable materials in vulnerable locations may intensify the severity of a wildfire. Some disasters make subsequent disasters more devastating than they otherwise might have been. For instance, the Christmas floods in San Bernardino County, California, in 2003, which killed 16 people, swept down mountainsides denuded of vegetation by wildfires just two months before. Some of these deaths were associated with debris flows, which occur after hillsides are made highly susceptible to failure after fires (see Cannon and Gartner 2004; Herel and Fimrite 2003; Chong, Renaud, and Ailsworth 2004). One thing just leads to another, we might say. The underlying point is that planners cannot and should not analyze landslides as an isolated phenomenon; the impact on the community results not only from geological factors and weather-related impacts on unstable slopes, but from accumulated human alterations of the landscape that are largely controllable.

The purpose of this PAS Report is to show planners and others how they can help to minimize the risks to human life and property from landslides by guiding development appropriately. Doing so is best accomplished by first placing an understanding of landslides within a larger understanding of the process of hazard mitigation and post-disaster recovery, which is what the remainder of this chapter does.

THE NATURE OF LANDSLIDE HAZARDS

Cruden (1991) defines a landslide as “the movement of a mass of rock, debris, or earth down a slope.” Landslides go by several names: debris flows, earth failures, slope failures, and mass wasting.

The obvious driving force behind a landslide is gravity, but a landslide occurs only when the force of gravity overcomes the inertial forces of friction that hold a slope together. The conditions that permit this to happen include high moisture levels, freezing of ice in jointed soil or rock, seismic activity, or destabilizing human activities, such as grading, digging, or the removal of vegetation. Thus, heavy rains and earthquakes both frequently trigger landslides, but operations like road building and mining often contribute to the severity of the event when it occurs.

The angle of the slope is a major factor for the initiation of landslides because steeper slopes more readily accede to the force of gravity than do slopes with lesser gradients. Planners should be cautious, however, about making a direct equation between slope and instability. In hilly terrain, the angle of many slopes simply reflects equilibrium between mass and gravity that depends in part on the strength of the material making up the hills. Stronger rock and soil can withstand greater downward pressures. On the other hand, steeper slopes tend to be less forgiving of human errors when development occurs. Hence, steeper slopes merit more caution during the planning process.

Landslides are an essential part of the earth’s natural geological processes. Like other hazardous occurrences, they become disasters only when humans have placed the built environment in the likely path of those processes. A landslide with no development or human presence in its path is not a disaster, but simply a natural event. Landslides, part of the transfor-

mation of the earth's surface since long before the advent of recorded history, serve to redistribute soil and sediments, including rocks, both gradually and abruptly, depending on the circumstances. Great quantities can slide downhill slowly over long periods or in a matter of seconds. It all depends on the precise balance of gravity and those forces that hold the soil or rock in place.

What Causes Landslides?

Landslides have both natural and human-induced causes. (See sidebar.) As Wieczorek (1996) notes, however, each landslide event does have a single trigger that sets it off no matter how many causes contributed to its formation. Ultimately, that trigger—the immediate factor setting the landslide in motion—is an external stimulus, such as intense rainfall or a volcanic eruption. It is important to understand how landslides occur naturally because human activities serve mostly to accelerate those natural processes, although in many cases that acceleration can fairly be described as dramatic. Regrettably, it also often results from foolish land-use decisions.

The formula that leads to a landslide is simple: Gravity exceeds friction. Friction is the resistive force holding the components of a slope in place, whether they are soil, rocks, vegetation, or structures. Given that gravity is a fixed force in the environment, the issue is simply what forces sufficiently weaken the friction that stabilizes the slope or any of its elements to allow sliding.

The primary natural process creating the conditions for landslides is known as weathering, which itself contains several subcategories. Chemical weathering is the alteration of mineral grains into types of rock that deteriorate and escape their moorings, often as the result of rain mixing with minerals and soil to produce materials more easily carried away by floods, winds, and other natural forces. Mechanical weathering results from abrasion, as when wind-borne sand gradually weakens rocks on a hillside. Biological weathering occurs as plant root growth and animal life break down rocks and minerals into soil from which they can extract vital nutrients. Biological weathering, however, tends to add to soil, allowing plants to take root, which in turn serve to hold the slope in place, so such weathering is often in the end a stabilizing factor against shallow slides. Some slides are less affected by vegetation but may still be influenced by its presence, particularly by the difference in rainfall infiltration between forested regions and grasslands. Eventually, when any of these forces have sufficiently weakened the friction holding a slope in place, sliding can occur.

Weathering of all types occurs at rates influenced by climate. Heat, cold, moisture, and the severity of storms all produce different impacts. For instance, in areas where water freezes and thaws during cold weather, decomposition of rock formations may result from the pressure caused by the expansion of water between rocks as it becomes ice, as well as from the action of the water on the rocks when it melts. This “frost heave” is essentially the same phenomenon that produces the potholes in highways in northern climates. The geologic composition of the slopes will also determine how much they are affected by such forces because some formations are more vulnerable than others.

The single most common trigger for landslides is water. This trigger can occur in a variety of forms, including intense rainfall, snowmelt, increases in groundwater levels, or changes in water level along coastlines, earth dams, and the banks of inland water bodies, such as lakes, rivers, and canals. Water plays a vital role by reducing friction within

CHECKLIST OF LANDSLIDE CAUSES

1. Geological Causes

- a. Weak materials
- b. Sensitive materials
- c. Weathered materials
- d. Sheared materials
- e. Jointed or fissured materials
- f. Adversely oriented mass discontinuity (bedding, schistosity, etc.)
- g. Adversely oriented structural discontinuity (fault, unconformity, contact, etc.)
- h. Contrast in permeability
- i. Contrast in stiffness (stiff, dense material over plastic materials)

2. Morphological causes

- a. Tectonic or volcanic uplift
- b. Glacial rebound
- d. Fluvial erosion of slope toe
- d. Wave erosion of slope toe
- e. Glacial erosion of slope toe
- f. Erosion of lateral margins
- g. Subterranean erosion (solution, piping)
- h. Deposition loading slope or its crest
- i. Vegetation removal (by forest fire, drought)

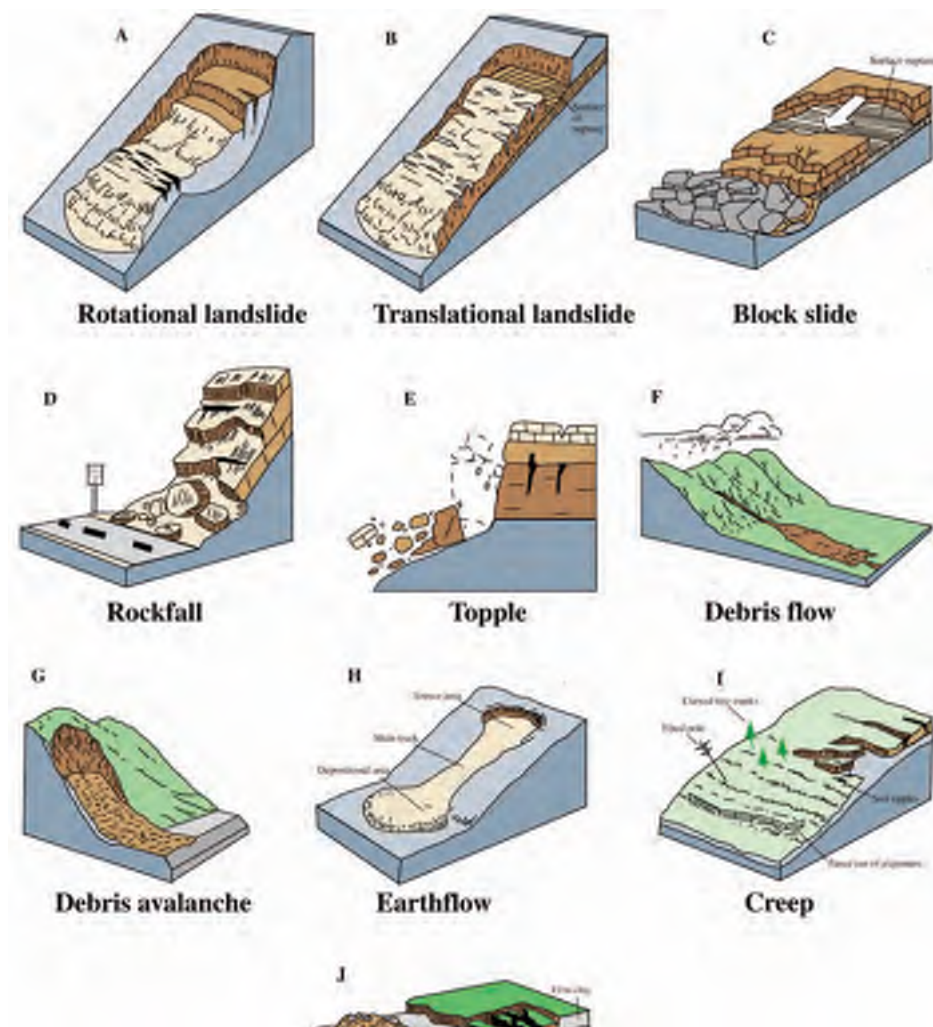
3. Physical causes

- a. Intense rainfall
- b. Rapid snow melt
- c. Prolonged exceptional precipitation
- d. Rapid drawdown (of floods and tides)
- e. Earthquake
- f. Volcanic eruption
- g. Thawing
- h. Freeze-and-thaw weathering
- i. Shrink-and-swell weathering

4. Human causes

- a. Excavation of slope or its toe
- b. Loading of slope or its crest
- c. Drawdown (of reservoirs)
- d. Deforestation
- e. Irrigation
- f. Mining
- g. Artificial vibration
- h. Water leakage from utilities

Reprinted by permission from Cruden and Varnes 1996 in Turner and Schuster 1996, p.70.

Figure 1-1. *Types of landslides.*

Source: Highland 2004

the soil that holds the soil in place. It does this by filling spaces where grains of soil would otherwise rub against each other, creating greater friction and more resistance to movement. Water also adds weight to the soil itself, giving further impetus to gravitational pull. Water can trigger both shallow and deep slides: the former during rainstorms, the latter as the water percolates downward over time. Lawn watering on slopes in arid climates, for example, can become problematic when it exacerbates any inherent slope instability. Misdirected drainage can produce the same effects but is remediable through the engineering of subsurface drains and wells.

Dramatic geological events can trigger landslides. Volcanoes have often spawned debris flows by superheating water in the soil or by melting glacier ice that rushes downhill. Such mudflows are known as lahars and can pose major threats to people and structures in their path. Earthquakes can destabilize slopes through not only their shaking action, but also through the liquefaction of unconsolidated soils. Usually, these soils are sands saturated by water that, once shaken by the earthquake's violent motion, acquire a liquid consistency, causing anything built on them to sink into the slurry. This phenomenon manifested itself in the collapse of the Turnagain Heights neighborhood in Anchorage, Alaska, during a 1964 earthquake, and again in the Marina District in San Francisco in the 1989 Loma Prieta earthquake.

Grading, excavation, deforestation, landscaping, paving, and other processes inherent in establishing the built environment on hillsides tend to destabilize slopes, allowing gravity to gain the upper hand over the natural friction otherwise holding the soil in place. The planner's goal is to minimize that impact to limit the potential for collapse. The planner's commitment to promoting public safety makes it essential to know the hillside's characteristics so that such outcomes are prevented.

Types of Landslides

Given variations in the material composition of slopes, in climate, and in topography, it is no surprise that landslides come in a variety of shapes and sizes (Figure 1-1). It is possible, however, to offer a fairly simple typology to suit most planners' purposes. Landslides typically have been divided into five types of movement: falls, topples, slides, spreads, and flows (Cruden and Varnes 1996). Each may be subdivided further, according to the material involved—rock, debris, earth, or some combination. Table 1-1 provides a glossary for categorization based on multiple descriptors that

TABLE 1-1: GLOSSARY FOR FORMING LANDSLIDE NAMES

ACTIVITY			
State	Distribution	Style	
Active	Advancing	Complex	
Reactivated	Retrogressive	Composite	
Suspended	Widening	Multiple	
Inactive	Enlarging	Successive	
Dormant	Confined	Single	
Stabilized	Moving		
Relict			
DESCRIPTION OF FIRST MOVEMENT			
Rate	Water Content	Material	Type
Extremely rapid	Dry	Rock	Fall
Very Rapid	Moist	Soil	Topple
Rapid	Wet	Earth	Slide
Moderate	Very wet	Debris	Spread
Slow			Flow
Very slow			
Extremely slow			
DESCRIPTION OF SECOND MOVEMENT			
Rate	Water Content	Material	Type
Extremely rapid	Dry	Rock	Fall
Very Rapid	Moist	Soil	Topple
Rapid	Wet	Earth	Slide
Moderate	Very wet	Debris	Spread
Slow			Flow
Very slow			
Extremely slow			

Reprinted by permission from Cruden and Varnes 1996 in Turner and Schuster 1996, p.38.

allow more precise characterization of any individual landslide. Unless planners have such training, they generally will rely on geologists and related professionals to make these determinations.

On July 10, 1996, at 6:52 P.M. Pacific Daylight Time, a huge rock broke away from Glacier Point, above Happy Isles, a popular trailhead and site of a concession stand in Yosemite Valley, California. The rock disintegrated when it landed, creating an air blast that was so powerful that it flattened as many as 1,000 trees in the area. Falling trees killed one person and seriously injured 14 others. The dust from the pulverized granite blocked out sunlight and coated tents and recreational vehicles. In 1999, another rockfall in the same area killed one climber and injured several others.



Falls

Falls involve the free-fall of rocks, debris, or earth through the air from some height, such as an overhanging cliff. A fall virtually requires a nearly vertical formation so that the falling material will not be impeded by anything but air between its origin and its destination. While not the most common type of landslide, it is especially dangerous and often lethal to any structures or people in its path simply because of the force of its impact, particularly from heights of a few hundred feet or more. Wieczorek et al. (2000) cite the example of a 1996 rock fall in Yosemite Valley, California, in which a rock between 23,000 and 38,000 cubic meters in vol-

E.L. Harp, U.S. Geological Survey

ume broke loose from Glacier Point and, upon impact, generated an air blast that knocked down nearly 1,000 trees, killing 1 tourist, injuring 14 others, and demolishing a trailhead concession stand.

Topples

A block of rock tilting precariously on some sort of pivot may lean or rotate forward, causing a topple. This may cause other blocks below it to move as well, sometimes in a domino fashion. It may or may not produce any subsequent slide or fall of other materials or soils.

Slides

Slides result from the downhill sliding of rocks, earth, or debris. Slides are often labeled by the type of material predominant in the slide, being either rock slides, earth slides, or debris slides. Debris refers to various kinds of unconsolidated materials, such as pebbles, loose sand, and gravel, as opposed to bedrock or soil. The speed of a slide can range from very slow to extremely rapid, depending on such factors as the terrain, the cause of the slide, and the angle of slope. The greater threat to human life generally accompanies rapid slides because of the lack of warning, but a slower-moving slide can nonetheless move massive quantities of earth, destroying or damaging millions of dollars worth of property in its path.

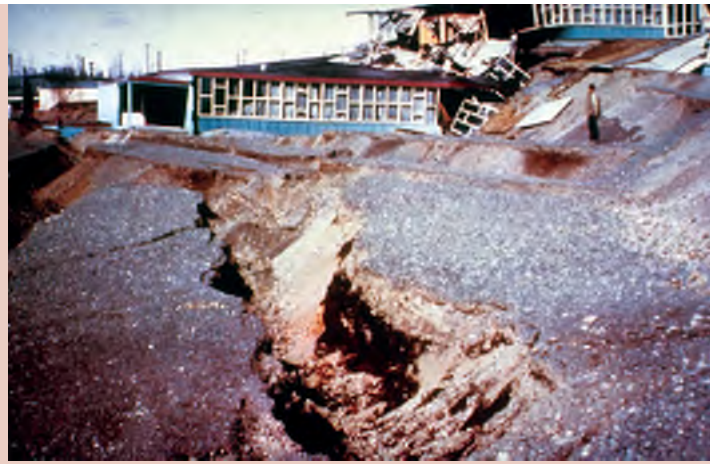
Geologists classify slides as either rotational or translational, depending on the shape of the area where the rupture occurs. Rotational slides have a curved zone in which a collapse occurs, launching the materials downward. Translational slides occur on relatively uniform or roughly planar surfaces with little rotation or backward tilting. Rotational slides are also commonly known as slumps. They frequently occur after earthquakes and long periods of heavy seasonal rains. Among earthquake-

ANCHORAGE, ALASKA

Triggered by an earthquake on Good Friday in 1964, landslides severely damaged public and private properties in Anchorage, Alaska. The landslides and ground subsidence caused more damage to structures than the ground vibration (Hartness 2001). One grade school positioned on a large landslide was almost completely destroyed. Another landslide caused a section of the business district to fall 10 feet and destroyed several commercial buildings, which were closed

due to the holiday. More than 70 private residences and almost two miles of coastland, part of which is now preserved as Earthquake Park, also suffered serious damage (Hartness 2001). Public infrastructure, including water and gas mains, telephone and electrical lines, and sewers were affected (Stover and Coffman 1993).

Anchorage has since adopted a Residential Alpine / Slope District. The district is “intended for use in those areas in the municipality where . . . slopes . . . soils, slope stability and geologic hazards require unique and creative design for development” (Section 21.40.115 of the Anchorage Code of Ordinances). The district is also intended to promote creative site design and engineering to ensure that development avoids geologic hazard areas.



U.S. Geological Survey

Close-up of Government Hill elementary school, destroyed by a landslide.

induced landslides, Turnagain Heights, in Anchorage, remains a dramatic example. Covering 130 acres and destroying 75 homes, it was triggered by the March 27, 1964, earthquake in Alaska (Schuster and Kockelman 1996).



B. Bradley University of Colorado

Results of the rock slide of 1903 at Frank, Alberta, Canada. In less than two minutes, 40 million cubic yards of rock from Turtle Mountain slid along a plane of structural weakness to cover the town of Frank.

Spreads

Another way in which soil liquefaction triggered by an earthquake can manifest itself is in a lateral spread, where the earth moves horizontally across a gentle slope. Because the material is shaken loose by ground motion, the spread can happen quite rapidly, triggering building displacement or collapse.

Flows

Very slow or extremely slow earth movements (see Figure 1-1) can occur incrementally at rates of less than an inch to two inches per year. In the end, such slow flows leave unmistakable evidence of steady movement, for example, in leaning utility poles, trees, or fences. More rapid flows, as the name suggests, require some significant element of water in the movement of other materials. Rock flows, debris flows, and earth flows all entail the movement of large volumes of solids mixed with water rushing downhill.

Boulders partially bury a house (Slide Mountain, Nevada) from a debris flow triggered by rapid snow melt in late May 1983. The rapidly-moving debris flow emerged from a canyon and killed one person, injured several others, destroyed or severely damaged five homes, and buried a highway.



It is not unusual for one type of landslide to evolve into another or for landslides to combine more than one type of movement. This combination of types of landslide movement is known as a complex landslide.

In addition to categorization by type of movement, landslides may also be characterized by the speed of the movement. Cruden and Varnes (1996) produced a description (see Figure 1-2) that rates these movement speeds along a logarithmic scale of distance over time, ranging from extremely slow to extremely rapid. They, however, proposed terminating the use of the imprecise term “creep” in favor of their more clearly quantified system.

Figure 1-2.
Proposed Landslide
Velocity Scale

Velocity Class	Description	Velocity (mm/sec)	Typical Velocity
7	Extremely Rapid		
6	Very Rapid	5×10^3	5 m/sec
5	Rapid	5×10^1	3 m/min
4	Moderate	5×10^{-1}	1.8 m/hr
3	Slow	5×10^{-3}	13 m/month
2	Very Slow	5×10^{-5}	1.6 m/year
1	Extremely Slow	5×10^{-7}	16 mm/year

Reprinted by permission from Cruden and Varnes 1996 in Turner and Schuster 1996, p.50.

SCOPE AND CONSEQUENCES

Landslides, by their nature, tend to be local events, often involving the collapse or deterioration of a single mountain-side or hill, and thus do not compete easily with large regional disasters, such as earthquakes and hurricanes, for national attention. They are rarely large enough to justify a presidential disaster declaration by themselves. That does not mean, however, that they are insignificant hazards.

Landslides often produce significant damage and losses of life. The losses are often tallied as part of a larger disaster, as in the 1964 Alaskan earthquake, because the landslides themselves were secondary consequences of the initial event that seized media attention. It is important, therefore, for planners to recognize the interdependence of these phenomena rather than to consider them in isolation. In many parts of the country, the same region or jurisdiction has numerous interrelated vulnerabilities. For instance, communities in the Puget Sound region are affected, often in combination, by earthquake, landslide, flood, volcano, and tsunami hazards. Many eastern cities with serious landslide hazards, such as Cincinnati or Pittsburgh, lie in or near major floodplains, where some of the slopes were carved out of the landscape by the watershed over thousands of years. Considered in this light, it would be irresponsible to dismiss landslides as less significant than other hazards because they are all intertwined to varying degrees.

Furthermore, when the event is local, so are the losses and the consequences. When there is no state-level or presidential disaster declaration, the financial responsibility for recovery and reconstruction falls entirely on local government and property owners. If that is not a sufficiently sobering thought for local planners, given the potential for substantial public losses from damage to infrastructure such as roads and public facilities, there is the problem of insurance. None exists to cover losses from landslides, with the rare exception of some mudslides that may meet criteria of the Federal Emergency Management Agency



The image shows earthflow material being removed by a highway crew along the Columbia Parkway. Hamilton County, in the metropolitan Cincinnati area, experienced an average annual economic loss from landslides of \$5.80 per person (1975 dollars) between 1973 and 1978, the highest calculated per capita loss of any municipality in the United States.

(FEMA) for coverage under the National Flood Insurance Program, presuming that the property owner had a policy in effect. In other words, a property owner who loses a home suffers a total, uncompensated loss. It is small wonder, then, that landslides produce more litigation over such damages than any other type of disaster. People who have lost everything have a propensity to find someone to blame, and a local government that may have unwisely permitted hillside construction is an easy and credible target.

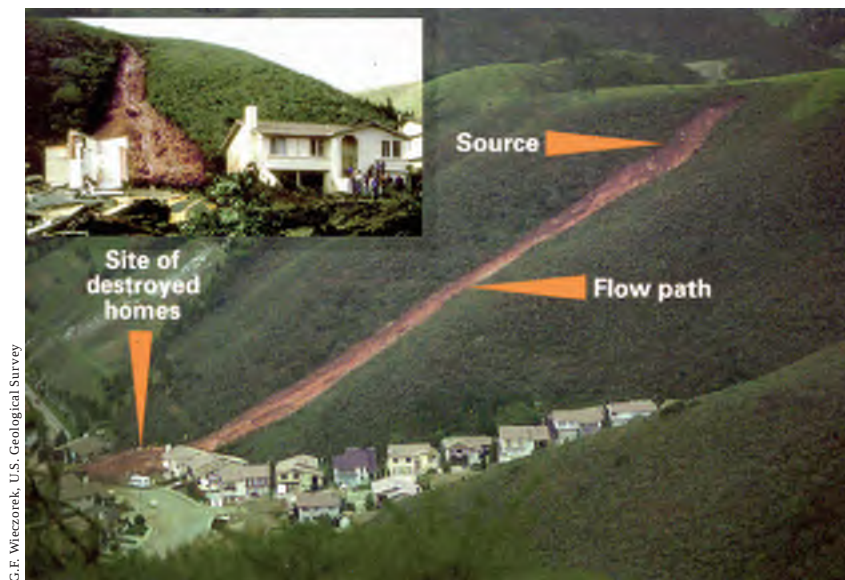
Although there is not a single reporting mechanism for tracking landslide losses nationally in the U.S., various studies have offered reasonable estimates that tend to be in the range of \$2.3 billion (in 2003 dollars) annually (Schuster 1996). It is a virtual certainty, however, that at least the expo-

sure to losses is growing because of increased pressures for development in areas more susceptible to slope failures. Much U.S. population pressure is in states and metropolitan areas that clearly have greater potential for slope failures, and much will depend in future years on both the degree to which that pressure is accommodated by local planning and the quality of the development that occurs in problematic areas.

As with other disasters, it is also important to note that losses can be both direct and indirect. The former are tallied as physical damage resulting directly from the event. These are both public and private losses, including damage to or destruction of houses and other buildings, infrastructure, and cleanup costs. The most common losses to public infrastructure are the costs of repairing roads and bridges, but costs can be incurred for damage to other public facilities, including parks and recreation facilities, particularly since they are often located in scenic but hazardous areas.

Indirect losses, however, can be far greater if the area affected is heavily dependent on a flow of outside traffic for economic well-being (e.g., tourism). A catastrophic event can impede such traffic for a period of time. In some cases (e.g., the 1983 landslide that closed U.S. Route 50 south of Lake Tahoe for more than two months), the indirect losses have been up to 20 times as high as the direct losses due to lost revenue and employment within the community (Schuster 1996). Depending on the severity of the disaster and the time needed for recovery, these losses may be merely seasonal or may last for several years as the community struggles to rebuild. Even without tourism as an economic base, the mere need to reroute traffic may

Debris flow from Pacifica, California, about 10 miles south of San Francisco, where three children were killed and two homes destroyed on January 4, 1982. Inset, shows view of destroyed homes from the street.



produce significant losses during the recovery period following the landslide, particularly if a business district is directly affected. Railroads, whose loss figures are private, often are among those suffering direct and indirect losses to major transportation facilities.

As noted above, the lack of insurance for landslide losses may serve to prolong the recovery process as victims seek to recover their losses through litigation, typically against contractors and local government. In the absence of some loss recovery, many homeowners may find themselves financially unable to rebuild, even while still holding debt related to the damaged property.

THISTLE, UTAH

A massive landslide in 1983 in Utah County, Utah, formed an earth dam across the Spanish Fork River. The dam created a 165-foot deep lake that swallowed the tiny town of Thistle, home to 50 residents who managed to evacuate in time. Losses and disruptions from this landslide were felt across the state as Thistle was an important rail and road junction: two major highways and two railroads converged there (Atwood 1983). This transportation junction, which had a considerable history dating back to eighteenth-century Spanish explorers, linked two important urban centers on either side of the Rockies (Denver and Salt Lake City) and

connected the state's southern coal counties to northern Wasatch County and Salt Lake City. Many local industries, such as coal, clay, cement, tourism, and concentrated feedlot operations, relied on this transportation network. Estimates of direct losses due to the landslide would eventually rise to more than \$200 million in lost revenues and taxes, and increased costs of distribution. When combined with indirect losses, the cost of the landslide, according to one estimate, was more than \$400 million (in 1983 \$; \$688 million in 2001 \$)(Schuster and Highland 2001).

Landslides are neither new nor unique in this region of Utah known for its canyons. If not for the ancient landslides that smoothed the rough terrain in this area, rail and road construction would not have been possible through this part of the Rockies. Before the 1983 landslide, geologists had been aware that the mountainsides had been buckling and rising for several months. An unusually high amount of rainfall, followed by a sudden snowmelt after a long, cold winter, preceded the massive landslide (Spiker and Gori 2003). Two prior, smaller landslides in the region also alerted geologists to the impending dangers (Atwood 1983). No action was taken to prevent more slides.

After a presidential disaster declaration, railroad engineers, U.S. Department of Transportation planners, the Army Corps of Engineers, and staff from several state and local agencies planned and built alternate routes, constructed a spill tunnel to manage the rise of water levels in the lake, and provided relief to affected residents and businesses. The area today remains a source of concern due to the high likelihood of the landslide reactivating, as happened in 1998. Thistle itself no longer exists; the town was buried under mud. It only appears on maps as a ghost town, visited by tourists eager to see the remains of a few structures protruding from the earth.



R.L. Schuster, U.S. Geological Survey

This landslide began moving in the Spring of 1983. The event was in response to ground water buildup from heavy rains the previous September and the melting of deep snow pack for the Winter of 1982-1983. Within a few weeks, the landslide dammed the Spanish Fork River, obliterating U.S. Highway 6 and the main line of the Denver and Rio Grande Western Railroad. Flood waters rose behind the landslide dam; the town of Thistle was inundated and destroyed. Total costs (direct and indirect) exceeded \$400 million in 1983 \$. This was the most costly single landslide event in U.S. history.

Some specific landslide disasters make clear the nature of potential losses. Schuster and Highland (2001) identified five landslides as being the most significant financially in recent U.S. history. The dollar figures provided are at the time of the disaster. Calculating current values would yield some astounding figures.

- *Alaska (1964).* The Alaska landslides were induced by a powerful magnitude 9.2 earthquake. Youd (1978) estimated that ground failure caused 60 percent of the \$300 million total damage from the 1964 Alaska earthquake.

MADISON COUNTY, VIRGINIA

An intense rainstorm caused hundreds of debris flows in the foothills of Blue Ridge Mountain in Madison County, Virginia, in the summer of 1995, depositing boulders and mud on residences and farms. Some of the flows moved very quickly and traveled more than a mile. They also deposited rock and other debris in already dangerously flooded areas. Power and telephone lines failed, and bridges and roads blocked by debris isolated communities from emergency responders. Farms, homes, and other structures were damaged or destroyed. The president declared the county a federal disaster area, allowing FEMA and other agencies to assist in recovery (Gori and Burton 1996).

Five major landslides caused about \$50 million (\$260 million in 2001 \$) in damage to housing, public and industrial buildings, and lifelines in Anchorage, Alaska's largest city. The Turnagain Heights landslide, one of several within Anchorage, destroyed 75 homes, but another on Fourth Avenue destroyed an entire block of the city's central business district. In one case, however, the L Street landslide, the city council later chose to rezone the area for higher residential densities, resulting by 1980 in extensive new construction (Schuster and Kockelman 1996).

- *Southern California (1980)*. Heavy winter rainfalls in 1979-1980 produced a series of landslides in six southern counties in California, resulting in total losses estimated at \$1.17 billion (in 2001 \$) (Slosson and Krohn 1982).
- *San Francisco Bay (1982)*. In January 1982, a severe storm in the Bay Area triggered no fewer than 18,000 debris flows and other landslides throughout the hilly metropolitan area. The disaster killed 30 people and left hundreds homeless (Ellen and Wiecezorek 1988). Altogether, the disaster struck 6,500 homes and 1,000 businesses, yielding a total damage cost of \$121 million (in 2001 \$) (Creasey 1988), but the damage continued into the courthouse, where property owners filed more than 930 suits claiming \$544 million (in 2001 \$) in losses against the city and county of San Francisco (Smith 1982).
- *Utah (1983-1984)*. The weather pattern known as El Niño resulted in heavy snow fall that turned into severe snowmelt in the late spring and early summer. The large infiltration of moisture triggered debris flows and landslides near Salt Lake City (Wiecezorek et al. 1989). In 1983, Utah's Thistle landslide produced direct losses exceeding \$344 million (in 2001 \$) (Anderson et al. 1984). Included in these losses was the \$73.7 million cost of a tunnel to restore railroad service disrupted by the slide. The disruption cost the Denver and Rio Grande Western Railroad \$139 million (in 2001 \$) (University of Utah 1984). The landslide also cut off two U.S. highways and created a lake by damming the Spanish Fork River with debris. The lake, later drained, drowned the town of Thistle that gave its name to the disaster, destroying 10 homes, 15 businesses, and railroad switching yards (Schuster 1996). This is clearly a case where serious transportation disruptions resulted in economic losses and unemployment. In the end, according to Schuster and Highland (2001), direct and indirect losses combined to total \$688 million (in 2001 \$), making it the single most costly landslide in North America.
- *San Francisco Bay (1998)*. With El Niño again pummeling the West with rain in 1998, the 10-county Bay Area suffered landslide losses estimated at \$140.9 million (in 2001 \$) (Highland et al. 1998).

Although the examples above all come from the West, it would be erroneous to assume that landslides are a uniquely western problem. Appalachia has long suffered from landslides, and a number of cities in the East and Midwest—Dubuque, Cincinnati, and Pittsburgh, for example—face ongoing challenges with development on steep slopes. Moreover, although not in the top five above, other landslides have produced notable losses in lives and property. A FEMA-supported investigation by the United States Geological Survey (USGS) of future hazards posed in Madison County, Virginia, was conducted after an intense rainstorm of 30.5 inches within 16 hours triggered nearly 1,000 debris flows on June 27, 1995 (Wiecezorek, Morgan, and Campbell 2000). (See sidebar.)

THE MAMEYES, PUERTO RICO (PONCE) 1985 LANDSLIDE

The deadliest landslide in the United States occurred in Puerto Rico in 1985 when 129 people died and more than 100 houses were destroyed. The slide permanently altered Mameyes, a predominantly residential area located in the north-west suburbs of Ponce, Puerto Rico. The Ponce region is the second largest population center on the island, and much of the development patterns follow the economics of settlement common to this region: sturdier construction in low-lying coastal areas surrounded by thatched housing in higher elevations and on hill slopes with little infrastructure and few city services. Mameyes is the latter kind of settlement, with indigent settlers in squatter communities on hillsides and densities approaching 15 dwelling units per acre. No modern sanitation or utility infrastructure exists in Mameyes except a road at the bottom of the slope and a water pipeline traversing the slopes.



R.W. Jibson, U.S. Geological Survey

In October 1985, a landslide destroyed 120 houses and killed at least 129 people—the greatest number of casualties from any single landslide in North America. The catastrophic block slide was triggered by a tropical storm which produced extremely heavy rainfall. Contributing factors could also have included sewage directly discharged into the ground in the densely populated area, and a leaking water pipe at the top of the landslide. Note the crescent-shaped scarp at the head of the slump.

Intense, record-breaking rainfall preceded the slide. The tropical wave that developed over this region eventually became the tropical storm Isabel. Even by tropical standards, the storm's effect was exceptional: Puerto Rico received nearly half its annual average rainfall in one day. Most streams and rivers on the island were flowing at record levels, many above 100-year levels. The slope that failed was angled at 14 to 25 degrees, steep even for well-engineered sites. It and the rest of the 450-foot high hill are composed of limestone and other geologic materials conducive to water percolation. At the bottom of the slope, a stream channel had steadily undercut the toe; the result was even steeper slopes, ranging from 25 to 30 degrees, and exposed limestone bedding surfaces, all of which eased the slide's movement. The grading for roads, pathways, and houses also disturbed enough top material to expose the underlying limestone. Most of the initial sliding was in three large blocks, each 36 feet thick, that covered a nine-acre area, but the slide quickly disintegrated into a rock fall with forces sufficient to crush buildings. The estimated total volume of the displaced material was about 1.2 million cubic feet, a magnitude beyond any local emergency response and recovery capabilities. Since the slide occurred in the middle of the night, most residents were asleep and did not have enough time to escape; several patrons of all-night bars located at the bottom of the slide area were also killed. Due to the plasticity of debris, which hardens when dry, rescue efforts to find the dead were halted after a few days.

Rain was not the only contributing source of the high water table on the slope that night. Geologists have identified two other sources: one was the cesspools residents used for domestic sewage that may have already saturated the slope, and the other was the six-inch water main that traversed the slope. Likely already leaking, this water main burst during the slide and turned the rock slide into a flow.

After the slide, geotechnical consultants hired by the city stabilized the slope using a combination of engineering measures. One was to terrace the hillside in widths up to 27 feet and compacted slopes of 22 degrees. For some of the slope areas, including the toe, fill material was used for additional strength. The consultants then installed surface and subsurface drains to channel stormwater to the sides of the slide area so as to minimize percolation. In terms of land use, the slide area is no longer residential. Due to both the new topography and the community's sensitivity toward the many victims still buried under the rubble, the site is now a memorial park.

The first question for planning in landslide-prone areas is whether they are capable of supporting development at all, and even if they are, whether allowing development is truly a wise idea. The first option should be risk avoidance.

Hurricanes, a weather phenomenon associated with the eastern U.S., can trigger landslides when those rains strike vulnerable areas because of the heavy precipitation they often unleash. Hurricane Camille in 1969 produced debris flows in central Virginia, causing most of the 150 deaths attributed to the storm (Williams and Guy 1973).

Another vulnerable eastern area of the U.S. is Puerto Rico, where the Mameyes landslide, triggered by rainfall, killed 129 people and destroyed 120 houses in 1985 (Jibson 1992). The death toll remains the largest from a single landslide in North America. (See sidebar.)

KEY PLANNING ISSUES

Two issues that seem primarily legal and financial in nature nonetheless have powerful implications for local planning because of their repercussions for planning practice. As noted, the lack of insurance to cover landslide losses tends to push devastated homeowners and business owners to seek restitution from local government if they feel they or their attorneys can make a case that local officials were somehow negligent in permitting or inspecting the failed development. In view of the potential liabilities involved, this can easily be a sobering consideration for planners and elected and appointed officials approving development applications. It raises a number of questions about the development approval process:

- How much responsibility does local government bear for ensuring that such development is safe?
- What level of risk does the property owner assume in choosing to live in a high-risk area?
- What is the builder's responsibility for ensuring that the slope remains stable?
- Is local government responsible for educating property owners about issues like proper landscaping and water usage?

The answers to these questions are important, but the problem is that often the questions are not raised early enough in the process of planning for high-risk areas. The most effective defense is a proactive planning stance that identifies effective risk management strategies before an area is ever zoned for development. The first question for planning in landslide-prone areas is whether they are capable of supporting development at all, and even if they are, whether allowing development is truly a wise idea. The first option should be risk avoidance. Planners and their communities have at their disposal strategies for implementing risk avoidance, including the acquisition of easements or full title to hazardous areas for open space preservation in order to sidestep entirely the question of which types of development are most appropriate. Later chapters will discuss how communities can make those kinds of determinations. (For a general description of risk assessment and risk management in land-use planning, see PAS Report No. 531, *Planning for the Unexpected*, February 2005.)

It is important to stress in this regard that, although it is always possible to propose engineering solutions in hazardous areas in order to facilitate development, such solutions are often expensive and may still be risky. Even with the best engineering calculations, construction mistakes may still be made, grading may not be done exactly as specified, and slopes may still be destabilized in spite of the best intentions. Restricting or prohibiting development in the most dangerous areas may often remain the wisest option despite pressures to the contrary. (See

PAS Report No. 466, *Planning for Hillside Development*, 1996, for further discussion of the hazards of engineered solutions.)

In many other cases, communities will find it acceptable to permit some kinds of development in hazardous areas, but not others. Much may depend on the level and types of risk involved, and on the conditions imposed within a given area. Chapter 2 discusses the process of planning to address landslide hazards in general. Chapter 3 looks at regulatory tools for implementing the chosen solutions. Chapter 4 of the report examines California's use of Geological Hazard Abatement Districts (GHADs), governmental districts formed to prevent, mitigate, abate, or control landslides and other geologic hazards. Chapter 5 offers two articles describing the variety of technical tools available to help planners better respond to landslide hazards. One of the articles is devoted to a discussion of the role of Geographic Information Systems (GISs) in hazard mapping and mitigation. Chapter 6 is composed of a number of case studies of local communities and their efforts and successes in planning to combat potential landslide disasters. And the final chapter, Chapter 7, describes state and federal roles in landslide hazard planning and mitigation, including California's Seismic Hazards Mapping Act, the U.S. Forest Service management of its lands, and the variety of federal agencies whose work helps combat the physical, social, and economic fallout from landslide disasters.

CHAPTER 2

Planning to Address Landslide Hazards

These days, the emphasis isn't just on one aspect of hazard mitigation anymore. If you are planning at the local level, every hazard in town matters. Part of the reason for this shift in emphasis is common sense. If you have more than one hazard in your community, say, flooding and landslides, along with the occasional hailstorm and blizzard, it is more efficient and logical to consider them all in the local comprehensive plan and to assign resources to mitigation efforts that address the most urgent problems.

The level of urgency is to some extent a value judgment but tends to be based on a combination of the frequency of the event, its probable magnitude, and the community's exposure, or vulnerability, to the hazard in question. For instance, landslides that will not affect any aspect of the built environment because their occurrence will be limited to preserved open space may be less of a priority than flooding from a river that flows through a historic central business district. On the other hand, the priorities could easily be reversed, with the river affecting relatively few properties but a potential landslide threatening numerous public and private structures and facilities. The first task of planning, then, is to assess the situation and decide which threats are most significant, as well as how one event may trigger another.

TRENDS IN HAZARDS PLANNING

As a result of the inherent logic of such planning, the law is also pushing communities to integrate all-hazards mitigation into their planning processes. At the federal level, the most significant impetus comes from the Disaster Mitigation Act of 2000 (DMA), which ties the eligibility of states and local jurisdictions for both post-disaster and pre-disaster hazard mitigation grants from FEMA to the development and approval of a state or local mitigation strategy that addresses all the natural hazards they may face. While it is not the intent here to review those mandates in depth, it is important to know the law exists, deadlines are already in force, and FEMA, APA, and state hazard mitigation officials all have information readily available for planners on what DMA requires. In addition, about a dozen states require a hazards-related element or hazard mitigation planning in another element (such as land use) within the local comprehensive plan. Prominent among these are the safety element in California, the hazards element required of coastal counties and jurisdictions in Florida, and compliance with Goal 7 in the Oregon land-use planning system. APA has examined and annually updated this information in an online report for the Institute for Business and Home Safety (Schwab 2005) that details the specifics of natural hazards planning for individual states. What is important for planners is an awareness that many of the same issues they will face in developing these plan elements will also apply to most of the requirements they face under DMA.

LANDSLIDE HAZARDS AND THE COMPREHENSIVE PLAN

The comprehensive plan is, among other things, the community's ideal and most complete statement of its vision for its own future. It is the vehicle for delineating future development intentions upon which implementation tools, such as development regulations, should be based. If it is assumed it is better to incorporate knowledge of and research about natural hazards and risk into the policy-making process sooner rather than later, the comprehensive plan becomes an ideal means of accounting for those risks, either in the original process of plan formation or as an amendment to an existing plan. Because landslides clearly are a serious potential risk factor in many communities, they merit attention from planners and local elected officials as they formulate land-use policy. If there are steep slopes or unstable soils within the community that pose risks, the hazards that pose those risks must be addressed in the plan.

In the U.S., authority for local government planning is established in state legislation. That context applies also to land-use and other planning to address landslides hazards.

About a dozen states require a hazards-related element or hazard mitigation planning in another element (such as land use) within the local comprehensive plan.

Where Landslide Hazards Belong in the Plan

Philosophies vary on exactly how best to address natural and other hazards within a comprehensive plan. Should hazards be specially addressed in a plan element devoted to hazards alone? If so, should natural and man-made hazards be addressed together? These are issues best left to other reports more broadly discussing such planning, but it is worth noting here only that the decision, whether spelled out in state legislation or made locally, will necessarily affect the treatment of landslides. In states that mandate hazards or safety elements, if landslides are implicitly or explicitly included in the legislative prescription for such an element, that is where they will go. States less prescriptive about local planning will leave more discretion to local government, but those jurisdictions can still look to such elements as potential models in the development of local plans.

Either way, given that DMA requires a local community to complete a local hazard mitigation plan and have it approved in order to qualify for hazard mitigation grants from FEMA, it makes sense to address landslides and other hazards in a comprehensive plan element that can simultaneously satisfy DMA requirements. Anything else ultimately sets up a scenario that may require duplication of planning work, usually at additional expense.

What is often missing, however, as APA has discovered in past research, is an effective link between the analysis and policy decisions in a natural hazards element or a freestanding hazard mitigation plan and the other elements of the comprehensive plan, as well as between that analysis and policy and other types of plans within the community that may affect de-

What is often missing . . . as APA has discovered in past research, is an effective link between the analysis and policy decisions in a natural hazards element or a freestanding hazard mitigation plan and the other elements of the comprehensive plan. . . .

BAINBRIDGE ISLAND, WASHINGTON

Heavy rainfall and melting snow during winter storms in 1996 and 1997 caused numerous landslides and debris flows in the Seattle area. Landslides wreaked havoc on both public and private property, causing millions of dollars in damages to roads, homes, and other infrastructure. One landslide derailed five cars of a freight train while another caused the deaths of a family of four when their house was destroyed by a debris flow on Bainbridge Island (Baum, Chleborad, and Schuster 1998).

Although the number of landslides that winter was unusually high, landslides in Washington are not uncommon. Local governments in the region typically address landslides as part of the natural hazard element of the comprehensive plan: these governments identify known landslide, slope stability, or other related hazard areas through maps, and they adopt model codes recommended by the state.

The land-use element of Bainbridge Island's comprehensive plan incorporates a slope stability map, which shows known landslide areas. Development policies for the island include a provision for geotechnical reviews, and development guidelines specify standards for buffers, land disturbance, and preservation in critical areas. The zoning ordinance mirrors plan policies in regulating development on steep slopes and known landslide areas. It also includes provisions for minimizing vegetation removal, performance bonds for construction, and disclosure requirements (through a notice on the title that indicates the property is in a designated hazardous area). Though some of these zoning provisions were in place before the fatal slide of 1997, it is unclear if anything short of a detailed geotechnical study and a landslide monitoring program would have prevented the construction of the houses in that location.



Landslide destroys home on Bainbridge Island, Washington, within seconds in 1997, killing four.

velopment in hazardous areas. (With regard to wildfires, for example, see Schwab and Meck 2005). Consider the following potential links between landslide hazards in a community and other elements of the comprehensive plan:

- *Land use.* People are attracted to developing on hillsides because of their scenic beauty. Along with the development of homes comes the entire fabric of infrastructure to support residential subdivisions, such as water and sewer lines, roads, utility lines, and sidewalks. Facilitating all this frequently entails a good deal of excavation and paving, and the addition of large amounts of impervious surface, plus changes in vegetation and landscaping. The risk assessment associated with such activity should be considered not only in a hazards element, but cross-referenced with a land-use element that can address location and design issues, such as clustering and intensity of use.
- *Housing.* Areas prone to various geological hazards are likely to have a good deal of local housing at risk. Preserving that housing stock in the face of these hazards may tie hazards to both the land-use and housing elements in the local comprehensive plan. For instance, Berkeley, California, in its 2003 general plan revision, determined that a disproportionate share of its affordable housing consisted of older structures known as “soft story” and “unreinforced masonry.” Loss of this housing in turn could portend major demographic changes in the city as older, damaged homes would likely be replaced with newer, high-income developments. The city addressed this threat through multiple initiatives, including seismic upgrading of many structures and encouraging the construction of new affordable housing (Johnson, Samant, and Frew 2005).

Landslides often damage roads in this area of the Rocky Mountains. The car plunged into a landslide in the middle of the night, just after the landslide had occurred (1994). Fortunately, no one was injured.



- *Transportation.* If housing necessitates road construction, development in areas with landslide hazards involves issues that should also be addressed in the transportation element, with transportation policies accounting for the risks involved.
- *Economic development.* Disruptions in daily life caused by disasters can pose major hazards to the economic life of the community. If those potential disruptions are addressed in the hazards element but ignored in the economic development element, something is amiss. This is particularly the case if existing development or the transportation

infrastructure is already threatened, yet there is no discussion of a recovery plan to assist local businesses and workers who must cope with a loss of economic activity. As noted in Chapter 1, this is precisely what happened on a significant scale following the 1983 Thistle landslide in Utah.

- *Historic preservation.* Many older small towns have historic (and scenic) central business districts, as well as historic residential areas, near hills or mountains. Other historic landmarks potentially affected could include such vital community facilities as churches. If those slopes pose a landslide threat to historic properties, how does the plan element account for these hazards? How much might the community be willing to invest in slope stabilization? What policies will handle the rehabilitation or demolition of damaged buildings if a landslide occurs? What, if anything, will replace them?
- *Open space and recreation.* A common technique for preserving an area that might otherwise fall prey to questionable development is to acquire it as public land for open space or recreation. A less expensive alternative is to acquire some or all of the development rights through public easements. Choosing appropriate targets for such acquisitions is a key function of an open space and recreation element in a comprehensive plan.

Linking Landslides Hazard Plans to Other Plans

It is essential that planners establish direct links between analysis and policies in the hazards element and the means of implementing those policies. One key ingredient of implementation is the community's capital improvements program. Planners should work with the department responsible for capital improvements so that any expenditure to mitigate landslide hazards is incorporated into the Capital Improvements Program (CIP).

Finally, many other plans affect the implementation of hazard mitigation. These include functional plans (e.g., for sewer or water extensions) and area plans (e.g., neighborhood or central business district plans). These are outgrowths of specific legislative, policy, and fiscal decisions to act on individual projects, such as building a retaining wall behind a dangerous slope or changing the width of a road or sidewalk. These plans offer a real opportunity to weave an awareness of various hazards into many of the routine functions of the planning process.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

Identifying hazards and assessing the risks associated with them is the cornerstone in the process of incorporating such concerns into the comprehensive plan. Guidance for this process already exists both generally as well as for many specific hazards, including landslides. For example, FEMA has developed a series of "how-to guides" for states and local communities preparing hazard mitigation plans (FEMA 2001, 2002, and 2003) to assist with compliance with DMA. Also highly useful for planning related to specific hazard categories is *Multi-Hazard Identification and Risk Assessment* (FEMA 1997), which describes the essential considerations for 23 different natural and industrial hazards. At the state level, Oregon's Land Conservation and Development Commission also provides a series of hazard-specific planning guides, one of which addresses landslide hazards (Oregon DLCDC and Community Planning Workshop 2000). One aim of this chapter is to focus this expertise on landslides and related hazards. Also see PAS Report 531, *Planning for the Unexpected: Land-Use Development and Risk*, writ-

Planners should work with the department responsible for capital improvements so that any expenditure to mitigate landslide hazards is incorporated into the Capital Improvements Program (CIP).

MAP SCALE FOR LANDSLIDES

The International Association of Geologists (1976), with planners and engineers in mind as the dominant user community, has differentiated mapping scales for zonation of landslide hazards. Zonation, a geological term, involves dividing land into homogeneous areas based on a ranking of their landslide hazard potential. The map scales are as follows:

- National (<1:1,000,000)
- Regional (1:100,000 to 1:500,000)
- Medium (1:25,000 to 1:50,000); typically, municipal or small metropolitan areas up to perhaps 200 square miles.
- Large (1:5,000 to 1:15,000); this is largely used at the level of site design (Soeters and Van Westen 1996).

ten in cooperation with the Public Entity Risk Institute, for recommendations about effective ways of incorporating risk assessment and risk management in land-use policy.

Mapping and Hazard Identification

The first step in the process is, quite simply, to identify the precise hazard and its location. The details, however, are seldom as simple as the broad concept. For landslides, mapping becomes an essential feature of that first step. Hazard identification, including the entire mapping process, serves several purposes within the context of the comprehensive plan.

First, it is hard to formulate an effective policy without knowing fairly precisely what environmental risks the community is facing. Landslide risks are very specific to certain terrains, and the solution must fit the problem. Clear hazard identification is also a signal to elected decision makers that certain kinds of development may be more problematic than others and should be considered more carefully. Given the liability issues discussed in Chapter 1, this is an especially poignant issue in connection with landslides.

Second, the comprehensive plan—like any other plan the community develops—is a signal to developers and other private investors concerning both the community's intentions and its assessment of its own strengths and weaknesses. Clearly researched hazard identification alerts wise investors to the existence and location of environmental risks and, one hopes, redirects their efforts toward locations, designs, and types of land uses the community deems most suitable for particular areas.

Some plans include explicit goals or policy statements concerning the community's intent to remain vigilant in gathering and using such information as an ongoing part of the planning process. For example:

Develop and maintain thorough knowledge of the location and distribution of geologic, seismic, and hydrologic hazards related to slope and soil stability, erosion, water table levels, and ground shaking. (Boise, Idaho, City Comprehensive Plan, Chapter 4: Environmental Hazards, 1997)

Much of the description and analysis of natural hazards will inevitably be textual, but maps today are invaluable for highlighting such issues and for condensing a good deal of essential information visually. As planners are well aware, maps come in a variety of sizes, and different scales are suited to different descriptive needs. (See sidebar.) National and even state maps may serve as guides to local planners trying to determine whether their region or community is deemed vulnerable, in a very general sense, to certain hazards. The level of risk, frequency of events, and similar data tend to cover broad ranges and are not highly detailed. Regional maps—for example, those of a metropolitan area—can begin to add higher levels of specificity. They are especially useful for determining constraints on large transportation and regional development projects (Soeters and Van Westen 1996).

Landslides, however, are highly localized phenomena. The nature of the hazard can vary with each hillside, its angle of slope, its geological composition, and its vegetative cover. A community-level map can identify hazardous areas and allow planners to define zones that require special attention or the creation of an overlay district with stricter development regulations. The area that needs to be covered will vary but must allow adequate scope to detect any suspected large-scale ground motion that may be lost in maps detailing smaller areas.

The implementation of regulations through such devices as site plan reviews will usually require the most detailed level of mapping. It is at this

point that planners seeking to guarantee public safety can get the information they need to suggest the realignment or relocation of a driveway, water line, access road, or other very specific features of a proposed new development.

What sources exist for this information? Local geological maps can use any or all of a number of sources of information, including topography, geology, and soils maps that are typically available from the U.S. Geological Survey (USGS) or state geological surveys. Planners can research the history of landslides in their own or neighboring communities, with whatever technical analyses may have been done in each case, especially concerning their causes. This historical inventory typically provides some of the most crucial information in the hazard identification phase of the planning process. Satellite photos can help to reveal broad changes over time on a regular interval, although they can also be hampered by weather conditions that may reduce their utility. Aerial photography, also dependent on positive weather conditions but for different reasons, can contribute another means of analysis by revealing the traits of a susceptible area requiring additional investigation. Trained geologists can conduct field surveys to identify problems, and they can also perform geotechnical tests through such techniques as drilling (to determine what layers of material lie beneath the surface) and measuring movement of earth, rocks, or debris over time.

Using the Experts

It is not normally the planner's job to handle these tests or develop hazard maps from scratch, but it does fall to the planner to access all the information available and determine its implications for safe development. Soeters and Van Westen (1996) distinguish between landslide hazard zonation as the domain of earth scientists and vulnerability analysis as the responsibility of planners, social scientists, and engineers. Zonation requires detailed knowledge of earth movement processes and the means of identifying them. Analyzing vulnerability, on the other hand, involves determining the impact of landslide hazards on people, the built environment, and the local economy, and thus involves consideration of density, land use, and economic recovery from disasters. What is essential, then, is that planners know enough about the danger signals that earth scientists identify to be able to interpret them in ways that will yield effective policy to protect the public. With that in mind, Tables 2-1 and 2-2 illustrate many of the data types that geologists will provide and planners will use, in pursuing the common goal of loss reduction. Table 2-1 includes the scale of analysis for the various data layers. Once this information is incorporated into a local geographic information system (GIS), planners can use it to analyze various data layers, as needed, to make decisions about acceptable land uses and the risks they may entail.

The result, as used in the plan, should be a set of maps that combine geological information about the location of documented landslides and of slopes susceptible to such hazards, the specific types of landslide hazards involved, and the location of existing land uses, critical facilities, and infrastructure that could be affected by landslides. In other words, the presentation of hazards within the plan should include not only the geological hazards, but the elements of the community assumed to be vulnerable, along with some informed estimate of the possible impact of disaster. For more on the use of GIS to map landslide hazards, see "Growth, Geology, and GIS" in Chapter 5.

As with other elements of the comprehensive plan, the types of maps used will vary with the community stories planners wish to tell. For

What is essential, then, is that planners know enough about the danger signals that earth scientists identify to be able to interpret them in ways that will yield effective policy to protect the public.

TABLE 2-1: OVERVIEW OF INPUT DATA FOR LANDSLIDE HAZARD ANALYSIS

Data Layers for Slope Instability Hazard Zonation	Accompanying Data in Tables	Method Used	Scale of Analysis		
			Regional	Medium	Large
GEOMORPHOLOGY					
1. Terrain mapping units	Terrain mapping units	SII + walk-over survey	3	3	3
2. Geomorphological (sub) units	Geomorphological description	API + field work	2	3	3
3. Landslides (recent)	Type, activity, depth, dimension, etc.	API + API checklist + fieldwork + field checklist +	1	3	3
4. Landslides (older period)	Type, activity, depth, dimension, date, etc.	API + API checklist + landslide archive	1	3	3
TOPOGRAPHY					
5. Digital terrain model	Altitude classes	With GIS from topographic map	2	3	3
6. Slope map	Slope angle classes	With GIS from DTM	2	3	3
7. Slope direction map	Slope direction classes	With GIS from DTM	2	3	3
8. Slope length	Slope length classes	With GIS from DTM	2	3	3
9. Concavities/convexities	Concavity/convexity	With GIS from DTM	1	1	1
ENGINEERING GEOLOGY					
10. Lithologies	Lithology, rock strength, discontinuity spacing	Existing maps + API + fieldwork, field, and laboratory testing	2	3	3
11. Material sequences	Material types, depth, USCS classification, grain-size distribution, bulk density, c and j	Modeling from lithological map + geomorphological map + slope map, field descriptions, field and laboratory testing	1	2	3
12. Structural geological map	Fault type, length, dip, dip direction, fold axis, etc.	SII + API + fieldwork	3	3	3
13. Seismic accelerations	Maximum seismic acceleration	Seismic data + engineering geological data + modeling	3	3	3
LAND USE					
14. Infrastructure (recent)	Road types, railway lines, urban extension, etc.	API + topographical map + fieldwork + classification of satellite imagery	3	3	3
15. Infrastructure (older)	Road types, railway lines, urban extension, etc.	API + topographical map	3	3	3
16. Land-use map (recent)	Land-use types, tree density, root depth	API + classification of satellite imagery + fieldwork	2	3	3
17. Land-use map (older)	Land-use types	API	2	3	3
HYDROLOGY					
18. Drainage	Type, order, length	API + topological maps	3	3	3
19. Catchment areas	Order, size	API + topological maps	2	3	3
20. Rainfall	Rainfall in time	From meteorological stations	2	3	3
21. Temperature	Temperature in time	From meterorological stations	2	3	3
22. Evapotranspiration	Evapotranspiration in time	From meteorological stations and modeling	2	3	3
23. Water table maps	Depth of water table in time	Field measurements of K_{sat} + hydrological model	1	1	2

Note: The last three columns indicate the possibility for data collection for the three scales of analysis: 3 = good; 2 = moderate; 1 = poor. Abbreviations used: SII = satellite image interpretation; API = aerial photointerpretation; DTM = digital terrain model; GIS = geographic information system; K_{sat} = saturated conductivity testing.

Reprinted with permission from Soeters and Westen 1996 in Turner and Schuster 1996, p. 133.

instance, if planners want to establish the broad context of landslide hazards within the community, they can use a map of the entire community that distinguishes particular zones of concern, preferably identifying the specific types and levels of severity of the landslide hazards involved. This type of map helps decision makers identify desirable areas for development as well as appropriate levels of density and areas that should be targeted for preservation of open space to avert problems before they arise. Within particular hazard areas, however, planners may want to offer even smaller-scale maps to clearly illustrate contours, soil types, and past landslide events. Maps detailing previous disasters are often of particular value in alerting the community and its elected officials to the reality of the hazards they face. The great value of GIS is the freedom it affords planners to choose the data layers that best convey the story they need to tell in order to make the case for the policies advocated in the plan. In this sense, the use of GIS is an art form be-

TABLE 2-2: MORPHOLOGIC, VEGETATION, AND DRAINAGE FEATURES CHARACTERISTIC OF SLOPE INSTABILITY PROCESSES AND THEIR PHOTOGRAPHIC CHARACTERISTICS

Terrain Features	Relation to Slope Instability	Photographic Characteristics
MORPHOLOGY		
Concave/convex slope features	Landslide niche and associate deposit	Concave/convex anomalies in stereo model
Steplike morphology	Retrogressive sliding	Steplike appearance of slope
Semicircular backscarp and steps	Head part of slide with outcrop of failure plane	Light-toned scarp, associated with small, slightly curved lineaments
Back-tilting of slope facets	Rotational movement of slide blocks	Oval or elongated depressions with imperfect drainage conditions
Hummocky and irregular shape morphology	Microrelief associated with shallow movements or small retrogressive slide blocks	Coarse surface texture, contrasting with smooth surroundings
Infilled valleys with slight convex bottom, where V-shaped valleys are normal	Mass movement deposit of flow-type form	Anomaly in valley morphology, often with lobate form and flow pattern on body
VEGETATION		
Vegetational clearances on steep scarps, coinciding with morphological steps	Absence of vegetation on headscarp or on steps in slide body	Light-toned elongated areas at crown of mass movement or on body
Irregular linear clearances along slope	Slip surface of translational slides and track of flows and avalanches	Denuded areas showing light tones, often with linear pattern in direction of movement
Disrupted, disordered, and partly dead vegetation	Slide blocks and differential movements in body	Irregular, sometimes mottled grey tones
Differential vegetation associated with changing drainage conditions	Stagnated drainage on back-tilting blocks, seepage at frontal lobe, and differential conditions on body	Tonal differences displayed in pattern associated with morphological anomalies in stereo model
DRAINAGE		
Areas with stagnated drainage	Landslide niche, back-tilting landslide blocks, and hummocky internal relief on landslide	Tonal differences with darker tones associated with wetter areas
Excessively drained areas	Outbulging landslide body (with differential vegetation and some soil erosion)	Light-toned zones in association with convex relief forms
Seepage and spring levels	Springs along frontal lobe and at places where failure plane outcrops	Dark patches sometimes in slightly curved pattern and enhanced by differential vegetation
Interruption of drainage lines	Drainage anomaly caused by head scarp	Drainage line abruptly broken off on slope by steeper relief
Anomalous drainage pattern	Streams curving around frontal lobe or streams on both sides of body	Curved drainage pattern upstream with sedimentation or meandering in (asymmetric) valley

Reprinted with permission from Soeters and Westen 1996 in Turner and Schuster 1996, p. 143.

DEFINING RISK AND HAZARD

exposure The number, types, qualities, and monetary values of various types of property or infrastructure and life that may be subject to an undesirable or injurious hazard event.

hazard An event or physical condition with the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

hazard identification The process of defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations or areas affected.

mitigation Sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery.

risk The potential losses associated with a hazard, defined in terms of expected probability and frequency, exposure, and consequences.

risk assessment A process or method for evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure, and consequences.

vulnerability The level of exposure of human life and property to damage from natural hazards.

cause, like an artist shaping the way in which we view some aspect of the world around us, the planner is helping to focus public attention on a particular way of perceiving challenges to the community. It is, in effect, a way of filtering data so that decision makers are not overwhelmed with a profusion of details.

When planners are reviewing actual development proposals that may require closer examination of landslide hazards, they may employ geotechnical engineers to do detailed studies of the building site. This subject is covered in Chapter 3 as a matter of implementation and code enforcement, but it can be noted here that such studies, both past and present, can also contribute to the depth of information available to planners to revise or update existing plans or develop future plans. Much of what we need to know about geological hazards lies beneath the surface, literally, and the potential for uncovering new information regarding those hazards is ever present. The development of any type of hazard information for planning purposes should be an iterative process incorporating all that has been learned in previous cycles of planning activity. The same is also true of any post-disaster analyses by geologists following landslides within the community or even in neighboring communities with similar hazard profiles.

Risk Assessment

The sidebar on this page contains a glossary of broadly applicable terms for hazard, risk, and vulnerability as they are used in connection with disaster-related planning and hazard mitigation. Landslides involve elements of risk and vulnerability common to other disaster types as well as distinct from them. Individual landslide events (e.g., the failure of a single slope) are far more localized events than is the case with massive storm phenomena, such as hurricanes or even many tornadoes, or with large-scale geological phenomena such as earthquakes, which typically affect whole regions or, in the case of the December 26, 2004, tsunami, 10 nations in an area spanning the shores of the entire Indian Ocean. At the same time, the landslide risk factor is elevated by the connection to such massive events. Risk assessment for landslides must often account for the potential impact of other events:

- *Rainstorms*, which can saturate steep slopes to the point where they can no longer sustain the weight of the water, and collapse
- *Wildfires*, which can denude a hillside of vegetation and create hydrophobic conditions that increase the risk connected with excessive precipitation
- *Earthquakes*, whose shock waves can destabilize a landslide-susceptible slope, particularly one prone to liquefaction
- *Flooding*, for example, from excessive mountain snowmelt, that may also trigger landslide activity downstream
- *Volcanoes*, whose eruptions have been shown to trigger massive landslides because of the superheating of soil, snow cover, and underlying water tables, among other possibilities

Thus, risk assessment for landslides is not always completely straightforward. It can involve both the failure of a single slope for reasons related solely to the instability of that particular slope, or it can involve a cascading series of events that produces multiple slope failures within the same area.



A rainstorm-generated debris flow a couple of months after a wildfire, adjacent to the Colorado River near Glenwood Springs, Colorado, caused major interstate traffic disruption in September 1994.

J. Scheidt, U.S. Bureau of Land Management

Risk itself is an abstract concept built upon a complex of other abstractions. These include the frequency with which the event is likely to occur, the potential severity of the event, and the exposure, or vulnerability, of the community to the impacts of the disaster. In all cases, one is dealing with probabilities. An event may be a certainty in due time, but the probability still attaches to any attempt to determine how soon that event may next occur. Because most natural hazards are cyclical in nature, disaster researchers sometimes refer to the likely *interval* between events, which can vary from a matter of years between floods of low magnitude to millennia for the eruption of many volcanoes. One notable feature of landslides is the remarkable degree to which human activity can accelerate the recurrence of such events by destabilizing slopes that otherwise might have endured much longer intervals between slope failures if left undisturbed. Humans may also be affecting the frequency of severe storms through global warming, as some scientists have predicted, but the connection between action and reaction would seem far less direct and certain than is the case with slope destabilization. Many slope failures, in fact, are the result of so much intervention in the landscape that they seem hardly to deserve the label of *natural* hazard.

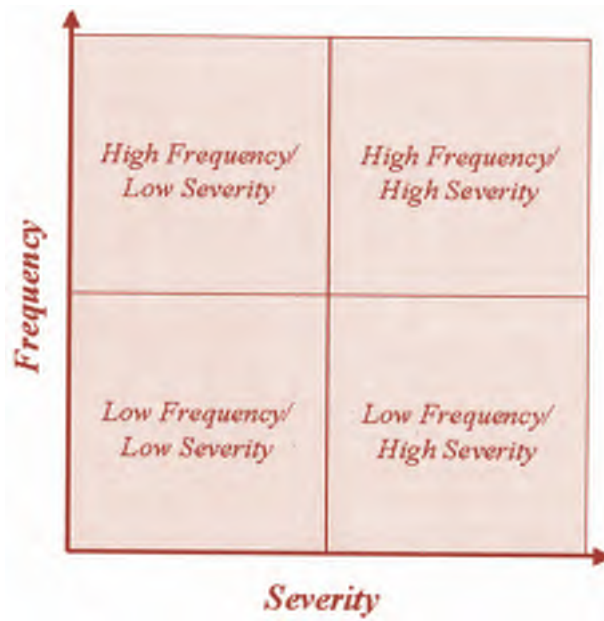


Melting snow and ice on the north flank of Washington's Mount St. Helens triggered this lahar (an Indonesian term for a "volcanic debris flow"), which rapidly traveled down the flanks of the mountain with the North Fork of the Toutle River. The melting snow and ice resulted from the 1982 eruption of Mount St. Helens.

Tom Casadevall, U.S. Geological Survey

These impacts of human activity on landslide-prone landscapes must be accounted for in calculations of both probable frequency and probable severity. The latter concept is also one of degree, but not as time-centered as the idea of frequency. Instead, it relates both to the idea of the worst-case scenario—what is the worst that can possibly happen given the known conditions—and to questions of likelihood. In the latter case, the issue is the most probable level of the severity of the event. Issues of potential severity may resemble a bell curve, in which the high point is the most likely magnitude. On one end are minimal impacts or none at all, and on the other end is the worst imaginable landslide under the circumstances. For which magnitude of event does one properly plan? (See Figure 2-1.) The policy decisions resulting from such risk assessment must ultimately deal with a thorny question: What level of effort is worthwhile given the probability of a stated event? As a more concrete example, Florida communities apply building standards designed to withstand a Category 3 hurricane, in large part because

Figure 2-1. Sample risk map.



Category 5 hurricanes are so infrequent that the higher cost of mitigation seems excessive. That does not at all mean that the more severe hurricane will never happen. It means only that communities have chosen not to design against it, taking their chances that a catastrophic hurricane will not strike for a long, long time. There is real risk involved, which is why people sometimes, with or without black humor, use the non-scientific term “nightmare scenario” to describe their worst forebodings about what *could* happen but seldom *does*. Homeland security, for instance, must of necessity examine such scenarios on a regular basis. After all, the terrorist attack of September 11, 2001, was truly a nightmare scenario. In the natural hazards field, the same could probably be said for the 2004 Indian Ocean tsunami.

For planning purposes, the most potent element of the overall equation is vulnerability. What enters the equation here is the inventory, whose creation planners are best prepared to oversee, of those elements of the community likely to be affected by a landslide. They include people (lives lost or injuries sustained), structures (damaged or destroyed), infrastructure (e.g., road blockages or water line breakages), and any other potential losses to which economists can attach a monetary value. These are all known as

direct losses; indirect losses, through disrupted businesses and loss of employment, can compound the economic impact of a landslide.

Vulnerability can be both real and prospective. Planners estimate prospective vulnerability when they examine the added impact of future build-out under current development policies. If zoning allows a certain density of development that has not yet occurred in landslide hazard areas, the analysis would determine the increased vulnerability the community would incur by continuing to permit that level of density on the simple grounds that what is permitted may eventually come to pass. This is becoming an increasingly important component of floodplain management in some communities, such as Charlotte, North Carolina (Godschalk 2005). It would seem to be a prudent consideration for addressing landslide hazards as well.

POLICY RESPONSES

The ultimate purpose of a comprehensive plan is to articulate policy regarding the community's future development. The purpose of all the foregoing exercises is to provide a coherent factual basis to support those policies. Because mitigation is not always easily sold, at least as a high priority, to the public or decision makers, it is all the more vital that hazard mitigation policy be supported by solid documentation of existing hazards and the vulnerabilities the community will suffer if it does not act to reduce potential losses. The recriminations that often follow a disaster invariably come at a poor time for finding out what should have been done but was never proposed.

Policy responses to natural hazards basically fall into two somewhat overlapping categories: pre-disaster mitigation and post-disaster recovery and reconstruction. The overlap lies in the fact that, while the primary purpose of the latter is to have procedures and policies in place to guide the process of rebuilding after a natural disaster, those policies and procedures should logically include mitigation efforts to make the community less vulnerable to similar future disasters. In other words, given the cyclical nature of most natural hazards, the aftermath of one disaster should be viewed as the prelude to the next disaster. Although this report relates specific mitigation efforts focused on landslides, other aspects of post-disaster recovery can best be dealt with on an all-hazards basis. Schwab et al. (1998) offer a model ordinance for governing the process of post-disaster recovery in an orderly fashion with clear lines of communication among local officials and some nongovernmental partners.

Here, we shall consider all mitigation opportunities together, but subdivide them into two categories: measures addressing prospective land uses and measures addressing existing uses. The former provide more opportunities for preventing undesirable types of development or development in undesirable locations before they actually materialize. The latter measures deal with the all-too-common problems affecting most communities of ameliorating problems already on the ground. It is a rare community that can focus exclusively on one or the other. Wherever possible, these options are accompanied by examples from local comprehensive plans illustrating those policy options.

Prospective Uses

Planners seldom work with a blank slate in creating policy for undeveloped areas. Even in the absence of housing, commercial, or industrial uses, or even transportation corridors, land almost always has some existing use, whether it be agriculture, parks, forests, or open space. Thus, the idea of "vacant" land can be very misleading. The real question typically facing planners is the use the land is being converted *from* and the use it is being

Policy responses to natural hazards basically fall into two somewhat overlapping categories: pre-disaster mitigation and post-disaster recovery and reconstruction.

The sure-fire way to prevent unwise development is for the community, if it does not already have title to the land, to acquire it in fee simple for some passive use, such as parkland or open space.

converted to. At the policy-making stage in comprehensive planning, the most likely issue is what sort of land-use conversion the community should deem most appropriate, given the location, proximity to other uses, and when landslides pose at least a potential hazard, the environmental constraints to developing the land.

This point is important because it can be a mistake to assume that, because a chunk of land with slopes currently has no permanent structures, the stability of those slopes has not been compromised. Irrigation from agriculture, the long-term effects of previous forest management, or even recreational uses, such as winter sports, may have influenced the slopes' ability to withstand further natural or human impacts. Even the extension of power lines or pipelines on a narrow right-of-way can have subtle destabilizing effects that should be considered when geologists and engineers examine the land's suitability for development.

Avoidance. That warning may seem a dubious prelude to the idea that the ideal type of mitigation is the avoidance of the hazard by foregoing development. However, the previously mentioned uses (with the possible exception of agriculture) are often some order of magnitude below the construction of buildings in their impact on the community in terms of increasing its vulnerability. Moreover, when land still constitutes open space in some form, the community has a relatively inexpensive option, in most cases, of acting to keep it as such.

For example, Provo, Utah, recognizing problems with existing development, signaled a change of policy for future construction in hazardous areas:

While it is too late to protect existing homes from this danger, caution must be taken to prevent new homes from being built in the path of potential rock falls, avoiding possible damage to persons and property. (Provo, Utah, General Plan, Environment Element, Geological Hazards, 1999).

The sure-fire way to prevent unwise development is for the community, if it does not already have title to the land, to acquire it in fee simple for some passive use, such as parkland or open space. Once the community owns the land, it can simply declare the land off limits to development, even encumbering it with deed restrictions that limit the community's own future options. City councils or voters in referendums have sometimes done this to ensure the permanency of a decision that could otherwise be reversed in a future election or by a different council majority.

Local and state governments have also worked cooperatively in other cases with local land trusts, either to provide permanent title to the land trust to manage the land or to acquire the land with deed restrictions against future development after the land trust first acquires the land itself and then deeds the land to a governmental entity with the restrictive covenants added. This technique has been used often, and with great effectiveness, by nature conservancies for areas of significant biodiversity. It is equally applicable to areas with unstable geology, although in some cases planners may need to identify additional reasons more closely associated with a particular land trust's stated purposes.

In either case, the local government or land trust must be vigilant about any dangers its ownership of protected open space may still pose to owners of adjacent parcels, especially downslope properties. Proper stewardship of such lands must include taking any necessary steps to protect not only the open space itself, but also the interests of neighboring landowners who could be adversely affected by slope failures.

Another approach often used for farmland preservation is the acquisition of easements restricting development of the land. The value of this

approach is its lower cost. It leaves the land in the hands of its existing owners while imposing deed restrictions on future uses of the land. For farmers, this serves the dual purpose of making farming more viable by paying them to forego the option of selling land for development while allowing them to continue their current operations and perhaps even pass the farm on to future generations within the same family. In landslide hazard areas, the easements might allow farming or forestry uses to continue, but there may be some other current low-impact activity preferable to allowing subdivision for residential construction.

Spokane, Washington, has adopted a policy of using open space acquisition tools to preserve landslide hazard areas but integrates that goal with others in a larger open space program.

Integrate the protection of slopes with wildlife corridor and nature space designations and acquisitions. (Spokane, Washington, Comprehensive Plan, Natural Environment Element. 2001.)

The transfer of development rights (TDR) is another tool often used for preservation of hazardous or sensitive areas from development. There is ample literature on the mechanics of the technique itself, but the basic idea is to supply a means whereby the landowner can receive compensation for development rights by allowing another landowner, whose property lies in an area deemed more suitable for development, to acquire those rights for use in that location. TDR programs operate both through open-market and government-managed transfer schemes. For example:

Work with Knob Hill landowners to transfer development off of the hill-sides to more suitable areas in the neighborhood or elsewhere in town. (Ketchum, Idaho, Comprehensive Plan, Part 9 Environmental Resources and Hazards, March 2001.)

Limiting public investment. Most private development is highly dependent on the extension of public infrastructure for its economic viability. That simple fact makes public investment policy a powerful tool in redirecting development away from hazardous areas and toward others considered more appropriate. The logic of this approach can also be extended to policies concerning maintenance of public facilities or the prohibition of private investments to create the infrastructure needed to support development in hazardous areas.

The County shall not accept dedication of public roads in unstable hillside areas, or allow construction of private roads there, which would require an excessive degree of maintenance and repair costs. (Contra Costa County, California, General Plan, Safety Element, 1996.)

Prohibit the financing and construction of public facilities or utilities in potential landslide areas. (Moraga, California, General Plan, Public Safety Element, Section 4: Seismic and Geologic Hazards, June 2000.)

Restricting development. Where total avoidance of the risk is not an option or is not deemed necessary, communities frequently adopt policies that seek to limit the *types* or *densities* of development, or both, in landslide hazard areas as a means of minimizing or reducing the risk involved. There is no one right choice. What is appropriate will depend on the magnitude of the hazards identified, the risks they entail, the slope of the hills in a specific development site, and many other factors that must be determined locally. The range of policy options available will vary with the community. A community whose land base consists mostly of hills, with little flatland, may choose to allow more development in such areas than another community with an abundance of flatter terrain. Where the community's land consists

In landslide hazard areas, the easements might allow farming or forestry uses to continue, but there may be some other current low-impact activity preferable to allowing subdivision for residential construction.

Judgments in the plan about what densities are acceptable for what types of land uses will depend heavily on the specific kinds of landslide hazards and the degree of added danger posed by different kinds of development.

almost entirely of slopes of varying degrees, decision makers may opt to allow development less acceptable in a mostly flatland community that has numerous options and whose hazardous zones constitute only a minor portion of its land area. Context is a vital consideration.

The policy of restricting the types of uses allowed in landslide hazard areas assumes the accepted uses will pose fewer dangers to life and property than the uses being prohibited. The rationale for this decision may relate to the ease of evacuation in the event of danger and the degree to which the use may suffer less significant or less consequential damages if a landslide occurs. For instance, permanent residential housing, especially as densities increase, can incur substantial losses, as can any public or private facilities likely to host large numbers of people, such as schools or hotels. On the other hand, many recreational uses can more readily be abandoned in the face of common signals of the probability of increased landslide hazard, such as heavy rains. They may also involve fewer drainage problems, depending on the nature of the recreation involved.

The following is an example of a policy seeking to prohibit high-usage public facilities on landslide-prone hillsides:

Do not locate community buildings or other structures designed to accommodate large numbers of people near fault lines or in areas where seismically induced slides are possible. (Moraga, California, General Plan, Public Safety Element, Section 4: Seismic and Geologic Hazards, June 2000.)

Another option is to allow only certain types of recreational uses, or something similar, in identified hazard zones. For instance, skiing and other outdoor recreational facilities, such as campgrounds, are often feasible uses so long as steps are taken to mitigate hazards sufficiently to avoid major problems.

Restricting density of development is a very common approach because density brings obvious problems for landslide hazard areas, including increased amounts of:

- impervious surface as a result of paving for roads and driveways;
- excavation of potentially unstable soils;
- disruption and removal of native vegetation that stabilizes steep slopes; and
- added needs for drainage facilities that may increase moisture burdens and hasten degraded slope stability.

Judgments in the plan about what densities are acceptable for what types of land uses will depend heavily on the specific kinds of landslide hazards and the degree of added danger posed by different kinds of development. There is no one fixed way to accomplish the goal of risk reduction through density control. In some cases, planners may wish to deal with such development on a case-by-case basis in order to take best advantage of variations within proposed development sites. For instance, the town of Bend, Oregon, does this through planned unit developments (PUDs):

In areas where the natural slope exceeds 20 percent, the city may reduce the minimum residential density (allow larger lots) or alternatively, may require cluster development through the PUD process to preserve the natural topography and vegetation, and improve fire protection. (Bend, Oregon, General Plan, Chapter 10: Natural Forces, November 1998.)

Clustering, as noted in the Bend example, is one means of keeping housing away from the most vulnerable slopes. This can be done also by relocating density within a site as well as by simply limiting density overall.

Redlands, California, uses such a means of redistributing density to less problematic portions of a proposed site:

Continue to regulate development on slopes greater than 15 percent (15-foot rise in 100-foot run) to minimize soil erosion, landslides, water runoff, flood hazards, loss of habitat, and wildlife hazards. Designate land exceeding 30 percent slope as Resource Conservation in the General Plan Diagram and limit development to one housing unit per 10 acres or one housing unit per parcel existing on the date of adoption of the General Plan if under 10 acres. Transferring densities from steeper areas to flatter portions of the site is desirable and preferred. (Redlands, California, General Plan, Health and Safety Element, 1995.)

Geotechnical studies. It is perfectly legitimate for planners to decide they need to know more about the hazards on a site before they can approve development. Requiring the submission of a geotechnical study of the site as part of the proposed site plan for a development application is a common device for obtaining that information. Enshrining that expectation in policy is a good way of signaling concern to prospective investors and developers that more will be expected in areas with known or suspected landslide hazards. Developers should know they must undertake such studies first, which certainly are an added expense and may be resisted by some property owners as a burden on their use of the land or a threat to its development potential.

Redlands offers another example of plan language:

Require areas identified as having significant liquefaction potential (including secondary seismic hazards such as differential compaction, lateral spreading, settlement, rock fall, and landslide) to undergo geotechnical study prior to development; mitigate the potential hazard to a level of insignificance; if mitigation is not possible, preserve these areas as open space or agriculture. (Redlands, California, General Plan, Health and Safety Element, 1995.)

Note that the last line addresses the options when mitigation proves infeasible. The following two examples come from communities where development rights are contingent upon the developer's ability to demonstrate the feasibility of mitigation to the city's standards:

Prohibit development in geologically hazardous areas, such as slide areas or near known fault lines, until appropriate technical evaluation by qualified independent professional geologists, soils engineers, and structural engineers is completed to the Town's satisfaction. Allow development only where and to the extent that the geologic hazards have been eliminated, corrected, or mitigated to acceptable levels. (Moraga, California, General Plan, Public Safety Element, Section 4: Seismic and Geologic Hazards, June 2000.)

Avalanche or Landslide Hazard Areas should not be developed unless the risks and adverse impacts associated with such development can be reduced to a non-significant level. Development proposed in or adjacent to avalanche or landslide hazard areas shall be adequately reviewed or mitigated to ensure development does not increase landslide or erosion hazards that would adversely impact downstream properties or natural resources. (King County, Washington, Comprehensive Plan, Environmental Element, 2000.)

These two excerpts demonstrate an important principle concerning landowners' expectations concerning property rights on unstable lands. The best way to deal with such rights is to shift the burden of proof away from the community, which in turn shifts the expectations as well. Policies concerning the most hazardous categories on a map should state that such

It is perfectly legitimate for planners to decide they need to know more about the hazards on a site before they can approve development.

Requiring geotechnical studies to identify hazards and adequate mitigation measures raises the question of who is qualified to perform the study, who will pay for the study, and who will review it.

lands are not normally developable, making permission to build contingent upon rigorous proof that building can be done safely and without adverse long-term consequences. The approval process must be tough and thorough, beginning with a geological study of the property to set the context, followed by an engineering study to describe how the developer would implement any required stabilization. Each step should require review by appropriate technical professionals in addition to planners.

Requiring geotechnical studies to identify hazards and adequate mitigation measures raises the question of who is qualified to perform the study, who will pay for the study, and who will review it. Many of these details can readily be addressed in development codes, but those codes should be based on a policy articulated first in the comprehensive plan. Moraga not only places the burden of funding the study on the developer, but requires town approval of the independent expert conducting the study as well:

Require development proposals to address geologic hazards, including but not limited to landslide, surface instability, erosion, shrink-swell (expansiveness) and seismically active faults. Technical reports addressing the geologic hazards of the development site shall be prepared by an independent licensed soil engineer, geologist and/or structural engineer, approved by the Town and at the expense of the developer. All technical reports shall be reviewed by the Town and found to be complete prior to the approval of a general development plan. (Moraga, California, General Plan, Public Safety Element, Section 4: Seismic and Geologic Hazards, June 2000.)

Minimizing alterations of the land. Restricting development may serve to reduce the strains placed on unstable soils by limiting the amount of necessary intrusion upon the landscape, but it does not guarantee the land alterations required as part of the construction work will be minimal, nor does it guarantee the quality of the work done to prepare the site for roads, utility lines, and building foundations, among other elements of a new subdivision or PUD.

Grading, cutting, and filling, each of which entails some risk of undermining the existing natural support holding the slope in place, merit special attention. In addition, all these actions necessarily remove some or all the vegetation that likely plays a major role in holding soil in place and reducing the risk of erosion and slides. Even if the vegetation is replaced after the alterations are made, it takes some time before the new vegetation can serve the same purpose as effectively as what was replaced.

Hence, many communities also choose to regulate the construction process itself with special restrictions in hazardous areas. For example, Bend, Oregon, has these two consistent policies in its plan:

The city shall require development on slopes in excess of 10 percent to employ measures to minimize the hillside cuts and fills for streets and driveways.

The location and design of streets, structures, and other development features on slopes in excess of 10 percent shall give full consideration to the natural contours, drainage patterns, and vegetative features of the site to protect against temporary and long-term erosion. (Bend, Oregon, General Plan, Chapter 10: Natural Forces, November 1998.)

As has been noted above, the water load on unstable slopes can play a major role in triggering a landslide because the added weight it brings can tip the balance of forces between gravity and the inherent friction of materials composing the slope. Land alterations that affect patterns of water movement may also increase the probability of slope failure. This

makes drainage a critical factor in construction practices. Under normal circumstances, best management practices for stormwater management would dictate holding water on site. The point of such practices, however, is in large part to hold developers and landowners responsible for managing their own drainage and not passing the problem downhill to others. For stable landforms, that works well, but on unstable slopes, it may be a path to disaster. Instead, the best approach is to control drainage by carefully directing it to the base of the slope, where the load can then be managed properly without courting disaster. In situations where such a solution is not workable, reverting to the risk-avoidance option may make the most sense. Presuming that the solution is workable, however, it is wise to adopt policies so that good drainage practices are properly implemented. For instance, Placer County, California, uses the following two policies:

In landslide hazard areas, the County shall prohibit avoidable alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems; removal of vegetative cover; and steepening of slopes and undercutting the bases of slopes.

The County shall require the preparation of drainage plans for development in hillside areas that direct runoff and drainage away from unstable slopes. (Placer County, California, General Plan, Health and Safety Element, 1994.)

Existing Uses

It is not uncommon for communities to uncover new hazards or to learn more about existing hazards after development is already in place. Land alterations, as noted, often serve to exacerbate existing slope instabilities. Moreover, geotechnical studies for site preparation, as well as post-disaster landslide investigations, often serve to enrich the body of knowledge a jurisdiction is able to work with to address existing problems. Mitigation for existing development is thus a critical element of a community's plans for addressing landslide hazards. The existing real estate in landslide hazard



Ground failure caused by the collapse of a coal mine in Lafayette, Colorado.

Courtesy of the National Oceanic and Atmospheric Administration/ National Geophysical Data Center

Planning remedies for hazard mitigation in built areas fall into two basic categories: remedial measures and relocation.

areas is often worth millions of dollars, all of which could be lost in an instant. In the most affluent communities, individual homes may in fact be worth that much. It is impossible to dismiss concerns about protecting such substantial investments by merely suggesting that they should not be there. Nationwide, our built investment in hazardous areas of all kinds is a major concern for insurers; the issue for planners is how best to improve the future safety of such areas.

Acquisition and relocation. Planning remedies for hazard mitigation in built areas fall into two basic categories: remedial measures and relocation. The latter is an expensive option typically involving public acquisition of a particularly hazard-prone property and its conversion to either public open space or some other relatively passive land use. In the National Flood Insurance Program, such buyouts are handled on a voluntary basis. Their attractiveness is enhanced to the extent that single or repetitive losses from flooding exceed the threshold at which rebuilding in the same location is permitted. In the absence of such a federal insurance program, however, landslide victims must depend on state or local buyout programs, which often do not exist. Moreover, while flooding can severely damage a building, it seldom physically moves it off its foundations, so the building typically is still standing when the waters recede. After many landslides, however, the building lies partially or completely beneath the slide in a way that renders it fundamentally unusable.

If a jurisdiction feels strongly enough that the hazards on some properties cannot be remediated adequately and that the structures need to be removed or relocated, decision makers must think seriously about the means of financing the necessary acquisitions and possible relocation costs. The prospect of liability or at least litigation in the aftermath of a slope failure may serve as a spur to such thinking. There is no free lunch in landslide hazard mitigation. The options can be stark.

Remedial mitigation. Communities and property owners can undertake other measures to mitigate hazards that leave existing structures in place. Some of these are structural, and some are regulatory. For example, there may be a need to correct existing drainage problems. This may involve relocating some physical elements of drainage infrastructure. One regulatory approach, however, may involve restricting or prohibiting lawn watering where the resulting moisture load could serve to destabilize the slope. Landscaping codes can govern the ways in which residents or property owners manage, plant, remove, or install various kinds of vegetation that may affect slope stability.

The most concrete forms of mitigation are devices, such as retaining walls, often used to stabilize slopes with existing problems. Communities seek to limit their use in undeveloped areas, but their use in developed areas threatened by potential slope failures is often a justifiable public investment. The financing, as with many other physical improvements benefiting a limited area, is often accomplished through assessments on the affected property owners.

In some cases, however, the city is protecting its own property. Mitigating the landslide threats to publicly owned buildings is a much more straightforward decision in most instances, but it does once again involve some consideration of costs and the means of financing them, as well as the losses the community may suffer from a failure to act. The fact that public buildings may be housing large numbers of people at the time a landslide occurs and that the city has potential responsibility for the injuries incurred can generate substantial impetus for taking steps to reduce those risks. Consequently, setting an example by mitigating the effects of

landslides on public property can become a priority within the comprehensive plan:

Mitigate problems with existing, unsafe city-owned structures according to priority based on level of risk, hazard to life, type of occupancy, method of construction, physical condition and location. (Boise, Idaho, Comprehensive Plan, Chapter 4: Environmental Hazards, 1997.)

Public Education. Finally, an important component of hazard mitigation is the sharing of hazard-related information with the public in a way that clarifies its significance. Landowners can take many steps on their own that will enhance public mitigation efforts. Such public education is especially important for landowners in areas with known landslide hazards. Moraga, California, makes this priority explicit in its comprehensive plan:

Educate the general public regarding methods to improve public safety, with specific information targeted to hillside homeowners on ways to minimize landslide and erosion hazards. (Moraga, California, General Plan, Public Safety Element, Section 4: Seismic and Geologic Hazards, June 2000.)

CHAPTER 3

Development Regulations for Landslide Hazards

Chapter 2 described planning considerations for landslide hazards. This chapter shifts to the subject of implementing the policies articulated in the comprehensive plan. Planners have a sizeable toolbox for implementing a wide variety of plan policies affecting land-use and development practices. The question here is which of these tools is best suited for implementing hazard mitigation plans for unstable slopes and other areas with landslide hazard potential. In the absence of good regulations and enforcement mechanisms, after all, policies often are toothless. In addition, the proper allocation of financial responsibility for both implementing mitigation measures and the consequences of slope failure is an important component in ensuring compliance with the goals of the plan.

Just as the previous chapter offered statements of policies from a variety of local plans, this chapter includes examples of specific ordinance language to implement policy.

ZONING AND LANDSLIDE MITIGATION

Zoning is a tool that designates the allowable categories of land uses for specific areas of the community, but it also is used to control the physical shape of the resulting development by prescribing such features as the allowable height and bulk of buildings, required buffers and setbacks, lot sizes, and allowable percentages of surface coverage. Many of these matter a great deal in landslide-prone areas, but not always for the same reasons that apply in less dangerous parts of the community. Landslide hazards often impose special considerations.

Slope-Density Regulations

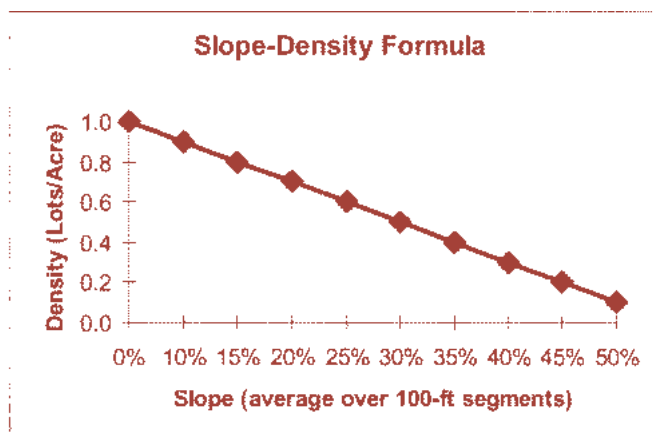
The underlying principle behind slope-density regulations is simple: steeper slopes require lower development densities. Specific formulas for determining the maximum allowable density may vary, but all involve some means of stepping down density at regular intervals of increased slope.

TABLE 3.1: SLOPE-DENSITY FORMULA

Slope of Land	Maximum Lots Per Acre
Up to 10%	1.0
10% to 14.9%	0.9
15% to 19.9%	0.8
20% to 24.9%	0.7
25% or more	No development allowed

Table 3-1 illustrates one such formula that is relatively easy to read. However, slope-density formulas can also be presented on a sliding scale (Figure 3-1) or other formats. Whatever mode of presentation is used in the ordinance, it should have the redeeming quality of being readily understood by all potential users.

Figure 3-1. Sliding scale slope-density formula.



Although Table 3-1 applies the slope-density method to lot sizes, it is equally applicable to densities in dwelling units per acre. In the latter case, the same calculation can provide greater flexibility by allowing differential placement of lots within the same area, facilitating clustering, which is discussed below.

Slope-density regulations are applicable in two basic sets of circumstances:

1. The community has already decided to allow building in the area where the regulations will be applied.
2. Planners have established a correlation between slope and landslide susceptibility through a geotechnical study or other review, and the reduced density will help to mitigate landslide risks.

The most common means of applying these regulations is through an overlay zoning district, leaving the basic zoning regulations in place but applying special slope-based density limitations. Thus, in reviewing development in the affected areas, planners must apply two maps. Overlay districts are a common device for achieving environmental objectives, such as floodplain management ordinances or groundwater protection, and so are readily adaptable for maintaining slope stability as well. The same regu-

It is important to note here, however, that the actual application of slope-density restrictions will usually await site plan review for either a subdivision or a PUD.

TILLAMOOK COUNTY, OREGON

Storm surges and high winter waves, combined with continual coastal erosion, regularly produce landslides along Oregon's Pacific coast. In Tillamook County, where the annual rate of coastal erosion in some places is two feet, damage from landslides has been regular and devastating. Cape Meares lost 350 feet between 1930 and 1960. Bay Ocean, a small residential community built in 1910, had disappeared by 1940. In 1991, a 600-foot-long slide carrying with it half-a-million cubic yards of dirt blocked a state highway 6 and created a dam across the Wilson River in Tillamook County. It cost \$2 million to repair the road and restore the river's flow. In 1993, a similar slide in Curry County blocked the main coastal highway, which remained impassable for two weeks until the construction of a bypass was completed (Oregon Geology Website [year]).

Development patterns in this region have altered the beach processes, affecting coastal deposition and erosion, leading to sudden and violent changes in terrain. Even recently built areas, such as The Capes, a gated community in unincorporated Tillamook County near Oceanside, did not escape damage from landslides when a nearby dune protecting the toe of the slope began to erode. The 1998 El Niño storms subsequently reactivated what was later determined to be a landslide that had long been underneath the development (Rinne 1998). What started as cracks on the surface eventually became a 900- by 500-foot landslide that remains active today. The county condemned four houses, evacuated 30 others temporarily, and is currently monitoring several more. A walkway that provided beach access was also destroyed. A lawsuit filed by the homeowners against the developers has since been settled out of court (Thompson 1999).

According to Tillamook County Assistant Planner William Holstrom (2002), the county had approved The Capes under the Planned Development Overlay district regulations. The overlay provides flexibility in preserving topography, geologic features, and drainage areas of the site, which would otherwise not be possible with the underlying zoning district (Land Use Ordinance Section 3.080).

Tillamook County plans and regulations take into consideration many of the conditions that lead to landslide hazards. First is the geologic hazard area designation. Though The Capes did not have this designation at the time it was approved, any development in such areas now requires a geotechnical hazard report by a certified engineer that assesses relevant geologic hazards. It also requires the planning director's approval of the area, which may not coincide with the development's site area. Second, the comprehensive plan's hazard element contains specific policies for development practices in geologically hazardous areas. Finally, the county's land-use ordinance includes a landslide map that identifies both active and inactive landslides. Ordinance provisions include soil and slope conditions, development standards for drainage and removal of vegetation, and submission requirements for geotechnical reports (Land Use Ordinance Section 4.070).

lations could also be integrated into the zoning ordinance, which may have the virtue of greater simplicity in a well-written code.

A later section of this chapter addresses special provisions in subdivision ordinances for minimizing landslide hazards. It is important to note here, however, that the actual application of slope-density restrictions will usually await site plan review for either a subdivision or a PUD. Applying the formula requires measurement of the slopes where proposed development will take place, a process seldom as straightforward as the formula itself. First, the developer must submit a site survey that will provide complete information about the topography of the site in question. Second, the planner reviewing the site plan must match an area-based formula with a linear measurement for the slopes affected, a process that requires averaging of the slope measurements within the area in which lot lines will be drawn. It is also important to be aware that slope-density regulations do not by themselves constitute a complete package of landslide mitigation measures. They provide a measure of safety by managing density and, hence, traffic, sewage and water capacity, and similar factors, but other mitigation efforts (e.g., grading controls) are still necessary for an effective overall strategy.

The means of accomplishing this purpose usually involves the specification of a minimum length of contour lines, which is the length of the straight-line segment used to draw the contour line. This provides an easy method for excluding small topographic features and focusing on the larger picture. Determining a workable minimum length requires an awareness of the importance of simplifying on-site verification before and during the construction process. Thus, rounding to easily measurable distances such as 100 feet is desirable in making the formula workable both for site plan review and for monitoring compliance as development proceeds.

An example of how this works in practice appears in the Paradise Valley, Arizona, code:

Section 2209. Density and Subdivisions/Lot Split Standards.

- A. The maximum number of lots into which Hillside Development Area land may be subdivided shall be the sum of the number of lots allowed in each slope category of land as shown by [the table on density /slope category].
- B. Slope shall be calculated using the minimum of three slope liens per acre. The slope lines shall be perpendicular to the slope and at equal distances across the lot.
- C. Each of the resulting lots shall meet the minimum lot size requirements based upon the average lot slope shown in [the table].
- D. Building envelopes shall be conceptually indicated on preliminary plats and accurately shown on final plats.
- E. The subdivider shall demonstrate by sketches, engineering drawings, charts, or other means that roads, public or private, and driveway access and placement of residential structures will conform, for each lot, to current hillside development regulations and without the need for a variance.
- F. All subdivision development and lot split applications shall comply with the Hillside Development Requirements as outlined in the Town of Paradise Valley Subdivision Ordinance and Article XXII of this Ordinance.

DENSITY-SLOPE CATEGORY					
Average Lot Slope %	Min. Lot Size Acres	Min. Lot Size –Sq. Ft.	Average Lot Slope %	Min. Lot Size Acres	Min. Lot Size – Sq. Ft.
10%	1	43,560	41%	6.8	296,208
11%	1.01	43,996	42%	7.6	331,056
12%	1.02	44,431	43%	8.4	365,904
13%	1.04	45,302	44%	9.2	400,752
14%	1.06	46,174	45%	10	435,600
15%	1.08	47,045	46%	11	479,160
16%	1.1	47,916	47%	12	522,720
17%	1.2	52,272	48%	13	566,280
18%	1.3	56,628	49%	14	609,840
19%	1.4	60,984	50%	15	653,400
20%	1.55	67,518	51%	16	696,960
21%	1.6	69,696	52%	17	740,520
22%	1.7	74,052	53%	18	784,080
23%	1.8	78,408	54%	19	827,640
24%	1.9	82,764	55%	20	871,200
25%	2	87,120	56%	21	914,760
26%	2.2	95,832	57%	22	958,320
27%	2.4	104,544	58%	23	1,001,880
28%	2.6	113,256	59%	24	1,045,440
29%	2.8	121,968	60%	25	1,089,000
30%	3	130,680	61%	26	1,132,560
31%	3.2	139,392	62%	27	1,176,120
32%	3.4	148,104	63%	28	1,219,680
33%	3.6	156,816	64%	29	1,263,240
34%	3.8	165,528	65%	30	1,306,800
35%	4	174,240	66%	32	1,393,920
36%	4.4	191,664	67%	34	1,481,040
37%	4.8	209,088	68%	36	1,568,160
38%	5.2	226,512	69%	38	1,655,280
39%	5.6	243,936	70%	40	1,742,400
40%	6	261,360			

Slope-density regulations can be quite simple if the challenges the community faces are themselves not very complicated.

Slope-density regulations can be quite simple if the challenges the community faces are themselves not very complicated. In situations where relatively little development is occurring and the resource base is relatively large, simplicity may be in order, even to the point of having just a single standard. Nashua, New Hampshire, reduces density by 75 percent on slopes equal to or exceeding 20 percent; Blaine County, Idaho, allows one dwelling unit per 40-acre lot on slopes greater than 25 percent. Matching the choice of percentage-based density reduction or lot size to the existing zoning scheme is a matter of assessing what works well administratively with the underlying standards for density and intensity. In either case, however, the slope-density regulations should be tied to a geotechnical assessment of any landslide hazard areas within the community. That assessment should determine the lowest degree of slope that can be identified as susceptible to landslides.

The applicability of slope-density regulations is not limited to residential development. It has already been noted in this report that hill-sides, with or without landslide hazards, often provide some of the most attractive scenery in the American landscape. In addition to residential development, scenic attractions can also lure tourist-oriented development, such as recreational facilities and bed and breakfast uses, as well as motels. These have their own zoning requirements in most codes, including those for parking. Both roads and parking lots impose their own physical burdens on the stability of slopes, and both are essential to seasonal and transient land uses. Scottsdale, Arizona, provides an example of how a formula can vary depending on the intended use and the type of structure involved.

The base and maximum intensities of development in the hillside land-form on slopes less than twenty-five (25) percent, on exposed/shallow bedrock, or in major or minor watercourses, shall be as follows:

SINGLE-FAMILY DETACHED ATTACHED MULTIFAMILY RESORT HOTEL/CASITA				
Nonresidential	D.U./Acre	D.U./Acre	Units/Acre	Floor Area Ratio
Base	0.2	1.0	2.0	0.05
Maximum	1.0	3.0	8.0	0.20

1. The underlying zoning must permit the base intensities and uses.
2. Intensities above the base level up to the maximum intensity may be approved by the City Council after notice and hearing as provided in Section 1.600 and 1.700, and upon a finding that the proposed intensity meets the guidelines set forth in Section 7.851 (B) [6.1031].
3. Resort hotel / casita units are limited to resort hotel guest rooms or casitas that do not have individual driveway access to each unit. Parking areas for more than five (5) cars, restaurants, meeting rooms, and other ancillary uses must be located on land that is not a severely constrained area. (Scottsdale, Arizona, Zoning Ordinance, Section 7.852)

USE RESTRICTIONS

Communities often decide that, for environmental reasons, certain land uses are simply unacceptable in certain areas. The potential of any type of development for triggering or contributing to a landslide would easily fall

A house in Kelso, Washington, torn apart by the landslide in 1999.



Marlene Morgan (home's owner)

within that line of regulatory logic. The justification for excluding particular land uses, as opposed to merely reducing density, would need to rely on some especially troublesome characteristic of the use that might affect slope stability. For example, some kinds of extractive industries have contributed to tragic slope failures. Heavily irrigated or watered agricultural uses or landscaping can also raise legitimate concerns. A less extreme mode of regulation would be to require conditional or special use permits for such uses, so that planners and planning commissions would have an opportunity to review individual land-use applications before deciding the proposed use could avoid producing adverse consequences.

As with other zoning, the typical ordinance provision restricting uses within an area susceptible to landslides is most likely simply to specify which uses will be permitted, along with describing the conditions that may apply to them. Anything not on the list is clearly prohibited unless the ordinance specifies conditions under which applicants can propose means of mitigating the hazard. The following example from Bellevue, Washington, illustrates a categorization of permitted and conditional uses, with the latter divided into those handled administratively by planners and those requiring approval by the planning commission:

Only the following uses may be located within a protected area designated by LUC 20.25H.070 or protected area setback required by LUC 20.25H.090, regardless of the provisions of LUC 20.10.440. Each use is subject to the applicable performance standards of LUC 20.25H.110 and the specified permit requirements of this paragraph.

B. Protected Area Uses.		Notes:
P =Permitted Use		(1) Must constitute an essential public utility defined by LUC 20.50.018.
A =Administrative Conditional Use		(2) Forested lands may not be converted to agricultural uses.
C =Conditional Use		(3) These include pedestrian trails and bridges which serve parks, commercial developments, or more than one single-family lot.
1. Communication broadcast and relay tower/microwave	C	(4) See Note (10) to LUC 20.10.440, Recreation Chart, for listing of types of park or facility requiring Conditional Use approval.
2. Botanical gardens	C	(5) An essential public facility may be located in a protected area or protected setback only if no feasible alternative location exists based on an analysis of technology and system efficiency, and is subject to the performance standards set forth for "essential public utilities" in LUC 20.25H.110.
3. Camping sites/day camp	A	
4. Parks: Public Private City	C C P/C⁴	
5. Agriculture	P²	
6. Horticulture	P	
7. Tree farm	C	
8. Fish hatchery, aquaculture	C	
9. Accessory sales of items produced on-site	P	
10. City of Bellevue utility facility	C¹	
11. Any other utility facility	C¹	
12. Local utility system	P¹	
13. Regional utility system	C¹	
14. Right-of-way	P¹	
15. Pedestrian facilities	P³	
16. Essential public facility	C⁵	

(Bellevue, Washington, Sensitive Areas Overlay District, Part 20.25H080, Permitted Uses)

Merely copying regulations from other communities, even neighboring ones, without documenting the geological characteristics that make those slopes dangerous is a shortcut difficult to justify. Stability depends on more factors than slope.

Decisions about use restrictions can be based on any of four types of characteristics associated with potential uses: site, activity, and structural characteristics, and the critical nature of the facilities involved.

Site development characteristics. For noncritical uses, use restrictions based on site development characteristics are common. Often these amount to restrictions not only in terms of permitted uses but in terms of the degree, if any, of alteration of the landscape permitted in connection with those uses. For instance, site alterations, such as grading of slopes, may be prohibited on any sites with too high a slope percentage. Northfield, Min-

Communities that want to achieve a higher level of precision in determining appropriate land uses may choose to distinguish between permissible and impermissible activities in landslide-prone areas.

nesota, insists that subdivisions be designed so as to eliminate the need for any grading on slopes exceeding 18 percent. Tacoma, Washington, disallows alteration of “any sites with landslide hazard areas on slopes greater than 40 percent.” The contrast is instructive. It is always important to observe that a slope considered too steep for development in one community may not be too steep in another. Merely copying regulations from other communities, even neighboring ones, without documenting the geological characteristics that make those slopes dangerous is a shortcut difficult to justify. Stability depends on more factors than slope. Those other factors, such as moisture, drainage, height of water table, and soil types, must be considered in the process of drafting effective regulations.

Before actually banning alteration of slopes, however, a community would be wise to consider whether that approach is truly necessary and based on solid geological evidence, or whether strict conditions can be applied so that slope alteration is conducted to achieve improved stability. In some cases, a slope may need to be stabilized for the benefit of neighboring property owners, and a developer willing to spend the money to do so may thus provide value to the community. In many places, such reconstruction is both technically feasible and cost-effective using grading and engineering hardware, making the result more stable, not less. Moreover, a set of strict conditions, including geological studies, external review, construction inspection, revegetation, and posting of bond, for review of proposed alterations under circumstances where it would otherwise be prohibited may provide an escape clause for the rare property owner who may in fact be willing to spend enough money to destabilize, reshape, and revegetate a slope to make it look natural.

Many of these details may well be uncovered in a site investigation, a prime reason for subjecting proposed developments to site plan review. For example, Billings, Montana, states in its ordinance that land “shall not be subdivided unless the hazards are eliminated or will be overcome by design and construction plans.” This puts the burden on the applicant to prove the proposed mitigation will be adequate to address the problems created.

Activity characteristics. Many uses include multiple activities, some of which are problematic on steep or unstable slopes and some of which may not be. Thus, communities that want to achieve a higher level of precision in determining appropriate land uses may choose to distinguish between permissible and impermissible *activities* in landslide-prone areas. Resorts, in particular, can be complex mixes of types of facilities with widely varying activities, ranging from golf to skiing to restaurants, conference centers, and short-term residential units. Simply permitting resorts, then, without distinguishing what is appropriate may not yield the desired results in terms of public safety.

For example, relatively low-density outdoor functions (e.g., golf or skiing, or hiking or horse-riding trails), may leave relatively few people in danger in the event of an emergency. They also involve relatively few permanent or expensive structures, thus minimizing economic losses as well for both the city and the property owner. (One caveat, however, is that uses such as golf courses that may entail irrigation can add unnatural levels of water to the slope.) For the same reason, their overall impact in an area with landslide hazards may be relatively low, even though there may be some cumulative impact on slope stability over time. On the other hand, a crowded dining hall in the path of a landslide could expose large numbers of people to risk of death or injury without adequate means of speedy evacuation. In such cases, it clearly matters what is allowed where on a site with a mixture of activities, and it becomes imperative that regula-

tions reach deeply enough into the range of possibilities to prevent catastrophe, as in the following example from Scottsdale:

Land uses in the hillside landform areas with land slopes over 25 percent, special features, or unstable slopes are restricted to the following, provided that uses must also be permitted by the underlying zoning: residential uses including resort units and related streets and utilities; the activities identified in the Conservation Open Space (COS) district; (Section 6.703 of the Zoning Ordinance) and golf tees. Ancillary resort uses, such as restaurants, meeting rooms, or parking areas for more than five cars are not permitted (Scottsdale, Arizona, Zoning Ordinance, Section 6.1040)

Even what seem like low-impact activities can pose serious problems if the site characteristics make those activities problematic. Placerville, California, is one of many communities that restrict routine skiing and sledging activities at resorts in locations at risk of an avalanche.

Structural characteristics. Structures vary in their impact on and suitability for various kinds of hazardous terrain, especially where potentially unstable slopes are involved. If density of development is a consideration, as shown in the examples cited above, it makes sense that height and bulk are reasonable criteria for zoning distinctions in landslide hazard zones as well. For example, it is easier to escape a low-rise building than a taller one in the event of real or prospective slope failure. That would become a basis for distinguishing between single-family dwellings and multifamily apartment or condominium structures in order to avoid placing large numbers of people at risk. It would also provide some logic for permitting surface parking while prohibiting multilevel parking garages.

In the following ordinance provision, Anchorage, Alaska, provides for conditional uses when the city prefers to have greater leeway in reviewing proposed development.

Conditional uses. Subject to the requirements of the conditional use standards and procedures of this title, the following uses may be permitted:

1. Utilities substations.
2. Planned unit developments.
3. Commercial recreation uses on sites of 20 acres or more.
4. Bed and breakfast with five guestrooms.
5. Roof-mounted satellite dishes greater than one meter in diameter or residential structures or structures accessory to a residential use (except satellite dishes up to two meters in diameter may be used until December 31, 2002).
6. Community interest and local interest towers that do not meet the supplementary district regulations. (Anchorage, Alaska, Zoning Ordinance, Section 21.40.115)

For a highly restrictive regime in an overlay district governing uses in an area with geologic hazards, there are these examples from Colorado:

Restrictions:

Unless authorized under the provisions of the “Permitted Uses and Activities” or “Provisional Uses” portions of this Section, the following activities or uses are prohibited within the Geologic Hazard Overlay Zone District. (orig. 9-7-82)

- a. Permanent or temporary structures and buildings, including mobile homes and trailers but not including signs, fences, corrals, or other open facilities for the containment of livestock. (orig. 9-7-82)
- b. Physical improvements or modifications, such as roads, bridges, bikeways, excavation or fills, solid or liquid waste disposal, utilities, or underground bulk storage of fuels. (orig. 9-7-82)

If density of development is a consideration, . . . it makes sense that height and bulk are reasonable criteria for zoning distinctions in landslide hazard zones as well.

- c. Other land use activities that significantly increase the danger from the geologic hazard. (orig. 1-20-76; am. 9-7-82; am. 12-28-82)
- d. Restrictions a. through c. shall not apply to legal mining operations or accessory activities. (orig. 9-7-82) (Jefferson County, Colorado, Zoning Ordinance, Section 48: G-H Overlay District)

• • •

12.4 USES PERMITTED

The following uses shall be permitted within the Hazard Areas to the extent they are not prohibited in any particular area by any underlying zoning district and provided that no structure is built which could endanger human life by either temporary or permanent occupancy. Any use not listed is specifically prohibited, including, but not limited to, any structure.

- A. Uses Allowed by Right
 - Agricultural uses, such as general farming, pasture, truck farming and sod farming, and underground mining.
- B. Special Use Allowed by Permit Only
 - 1) Public and private utilities.
 - 2) Other open uses, such as parking areas, airport landing strips, etc., but not junkyards or solid waste disposal facilities.
 - 3) Public and private recreational uses, such as parks, swimming areas, golf courses, driving ranges, picnic grounds, wildlife and natural preserves, fish hatcheries and hunting, fishing and hiking areas and, if such uses do not cause concentrations of people in areas during periods of high hazard probability.
 - 4) Open pit mining for removal of top soil, sand, and gravel.
 - 5) Private and public roads and driveway structures.
 - 6) Public and private utilities.
 - 7) Any use not listed above is specifically prohibited, including, but not limited to, any structure unless approved in accordance with the provisions of Section 5, "Special Uses Allowed by Permit Only."
 - 8) Surface mining.
 - 9) Milling, leaching, or other mineral extraction. (Ouray County, Colorado, Geologic Hazard Area Regulations, Section 12.1)

Critical facilities. In the case of critical facilities, it is generally a matter of common sense that a community would not want a fire or police station, for example, sited in a vulnerable location where its loss to disaster would then deprive residents of emergency services. Fire stations, hospitals, and other critical facilities need to be located where the potential for damage is minimal, so they can function even when other structures have been disabled. It is relatively easy for the city to choose not to place its own municipal facilities in harm's way, or at least to mitigate the risks in appropriate ways, but many critical facilities, such as electrical power lines and medical facilities, are typically privately owned. In those cases, the alternative to an outright prohibition, where that solution may be too draconian, is to establish a set of strict requirements for mitigation of landslide hazards in order to issue a conditional or special use permit.

Buffers and Setbacks

Buffers and setbacks are two closely related approaches for attacking the problem of mitigating landslide hazards. Buffers deal largely with the outside boundaries of parcels and entail some treatment of the land, whereas setbacks generally refer to the distance between a structure and a parcel boundary.

Buffers are commonly used to mitigate a wide variety of types of potential environmental damage by separating human activities on a site from surrounding natural systems that need to be preserved and protected. As such, they include some element of preservation or environmental treatment, such as the maintenance of vegetation along a stream corridor. However, buffers should not be seen simply as environmental protection. Because natural hazards are so often an issue in the creation of buffers, the protection really extends in both directions: to the extent that buffers are used to protect the natural systems from development, they also serve to protect development from the impacts of natural hazards. Stream buffers, for instance, serve not only to protect riparian vegetation and stream quality, but often serve as a buffer for development against the impacts of flooding and may even serve to reduce the frequency and severity of floods.

In the case of landslide hazards, the goal is to reduce the impacts of development on areas with known or potential hazards, such as steep slopes, ridge lines, and areas with soils susceptible to landslides. Those impacts include soil disruption through grading, drainage, and seepage from homes and septic tanks. Basically, buffers are additional setbacks with performance objectives related to landslide hazard mitigation. These performance objectives may vary with the circumstances, but generally involve slope protection and the control of runoff. One caveat about the use of buffers for maintaining slope stability, however, is one should not assume they will always involve active maintenance of green space if that means watering or irrigation of plants. Some communities actually prohibit the watering of plants in vegetated buffers precisely because excessive moisture can help trigger landslides in the first place. Xeriscaping, the use of drought-resistant plants, may often be a more logical solution, depending on the local climate.

The common reference points for buffer distances are ridge lines, hill-tops or crowns, and the toes of slopes. This necessarily requires planners to rely on contour maps to identify these features. The following ordinance excerpt highlights this approach:

A buffer of 50 feet shall be provided from the edge of all slopes that are geologically hazardous areas. The edge of a slope is defined as the top, toe, and sides of the slope. The buffer may be extended beyond these limits to mitigate hazards. The buffer may be reduced if the applicant provides expert verification by a geotechnical engineer, as specified by the city engineer, that demonstrates that the proposal will not adversely impact the geologically hazardous area. (Bainbridge Island, Washington, Municipal Code, Section 16.20.080C.1.2c)

Sometimes, a greater level of discretion or analysis is required for the technical staff to determine either the appropriate size of the buffer or the areas that should be recommended for such treatment. This is a critical role for geotechnical analysis in the development review process.

An undisturbed buffer adequate to assure that risk of slide is reduced to levels acceptable to geotechnical engineers shall be required for all structures intended for human user occupation. The buffer shall be measured on the surface and is required from the top, toe, and along all sides of any existing landslide or erosion hazard area. (Lewis County, Washington, Geologically Hazardous Areas, Section 17.35.920)

• • •

A 50-foot vegetated buffer shall be maintained from the top and along the sides of the landslide hazard area or steep slope. A 25-foot vegetated buffer shall be maintained from the toe of the landslide hazard area or steep slope.

Basically, buffers are additional setbacks with performance objectives related to landslide hazard mitigation.

*Paved areas that require
impervious surface
complicate drainage issues
by reducing the area with
natural drainage, adding
nonpoint-source runoff to the
remainder of the site, and
thus are a target of many
setback requirements for
hazardous areas. . . .*

The buffer widths may be adjusted to a greater or lesser extent by the director and based on the conclusions of the geotechnical report submitted.

Existing native vegetation and mature trees within such buffer shall be conserved, except hazard trees may be removed upon approval by the city's urban forester. New plantings must consist of native vegetation.

Any areas recommended for planting or for maintenance of vegetation according to the geotechnical report shall be identified and the proper action reinforced by a conservation covenant or similar instrument. Maintenance of vegetation shall be the responsibility of the proper owner. (Vancouver, Washington, Special Standards, Landslide Hazard Areas and Steep Slopes)

. . .

MINIMUM BUFFER REQUIREMENT

The buffer for all geologically hazardous areas and areas of geologic concern shall include native vegetation from the toe of the slope to 25 feet beyond the top of the slope unless otherwise allowed through a geological report or a site-specific determination.

. . .

BUFFER AND BUILDING SETBACK MODIFICATIONS

The minimum native vegetation buffer and/or building setback requirement may be decreased if a geotechnical report demonstrates that a lesser distance, through design and engineering solutions, will adequately protect both the proposed development and the erosion hazard and/or landslide hazard area. Should the geotechnical report indicate that a greater buffer and/or building setback is required than specified, the greater buffer and/or building setback shall be required. The department may determine through a site visit, special report, or mapping, that an increased buffer and/or building setback is required from the critical area. (Kitsap County, Washington, County Code, Development Standards—Geologically Hazardous Areas)

Setbacks, specified along with buffers in the Kitsap County ordinance above, can apply to both structures and graded areas within a lot. Graded or disturbed areas are those where the natural terrain or topsoil has been altered for various purposes including the creation of lawns, parking areas, or playgrounds. Paved areas that require impervious surface complicate drainage issues by reducing the area with natural drainage, adding nonpoint-source runoff to the remainder of the site, and thus are a target of many setback requirements for hazardous areas, where such problems can increase the possibility of slope failure. To offset such problems, Yarmouth, Maine, defines the setback as a function of slope, requiring 10 feet of setback for each 5 percent increase in slope. Kitsap County, Washington, set the minimum setback equal to the height of the slope, plus 25 feet, for its geologically hazardous areas.

Building/Impervious Surface Setback Requirements.

- a. Geologically Hazardous Areas. The minimum building and impervious surface setback from the top of slope shall be equal to the height of the slope (1:1 horizontal to vertical) plus the greater of 1/3 of the vertical slope height or 25 feet.
- b. Areas of Geologic Concern. A minimum 40-foot building and impervious surface setback shall be maintained from the top of slope. As required in subsection (3) above, the 25 feet adjacent to the top of the slope shall be retained as a native vegetation buffer, with an additional minimum 15-foot building and impervious surface setback. The department may decrease the setback when such a setback would result in a greater than 1:1 slope setback or as may be allowed under Section 19.400.410(B) (Site Specific Determinations).

- c. Toe of Slope Building Setback. A geotechnical report may be required for any new construction within 200 feet of a geologically hazardous area. The department will make a determination based on slope height and stability indicators. Where slope hazard indicators are not identified, the requirements of the Uniform Building Code, Section 1806, will apply. (Kitsap County, Washington, Geologically Hazardous Areas, Section 19.400.415)

Impervious Surface and Disturbance Areas

Buffers and setbacks can ensure a safe distance for development activities from ridge lines, slope toes, and other vulnerable features of landslide hazard areas, but communities often wish to restrict the overall amount or percentage of graded land or impervious surface largely because of the drainage issues discussed earlier. Impervious surface is the total graded or covered area on a given site impeding the infiltration of water into the ground. This blockage of infiltration forces rainwater (often contaminated with pollutants from asphalt or motor oil) onto the remaining pervious surface within the lot. Because excessive moisture from runoff can contribute to slope failure, this concentration of runoff on the remainder of the site can create serious problems. The solution is to minimize the area whose permeability is thus compromised by development.

Permissible amounts of impervious cover usually appear in ordinances as percentages of the overall lot area. The maximum allowed includes the building footprint, driveways, and parking areas. Some communities also regulate the depth of impervious cover in order to avoid impeding the natural flow of groundwater. The regulations can also specify setbacks for impervious cover from particular features of the landscape that are either hazardous or in need of such protection, as in this Nebraska ordinance:

Disturbance of sensitive or unique features. Any removal, addition, or relocation of soil or other fill materials, or the removal or destruction of any vegetation on or within 50 feet of any land which contains one or more of the following: (a) native prairies, (b) intermittent and perennial streams, (c) loess bluffs and glacial till, (d) extremely steep slopes. (Omaha, Nebraska, North Hills Environmental Overlay District)

Given variations in steepness and stability of slopes, one size does not always fit all. It may be necessary to calibrate the percentage of disturbed area to reflect greater challenges in some terrain than in other areas. Frisco, Colorado, uses this approach to ramp up standards for areas with steeper slopes.

(3) Site Disturbance Standards. All development in areas with steep slopes greater than 15 percent shall comply with the following standards. To qualify as a steep slope, the subject area must have at least an eight-foot vertical rise from any one contour line on a topographic map at any point along the continuous sloped area. For purposes of calculating the vertical rise of a continuous slope when determining whether this criterion is met, it is assumed that the slope may cross property lines.

- (a) Development may occur on lands that contain only limited areas of steep slopes in excess of 15 percent. For a development to be considered to be occurring on lands that contain limited areas in excess of 15 percent slope, it shall comply with the following:
 - 1) On slopes from 15 percent to less than 30 percent, site disturbance shall not exceed 50 percent of the total area within this range of slopes.
 - 2) On slopes greater than 30 percent, site disturbance shall not exceed 15 percent of the total area over this range of slopes.

Given variations in steepness and stability of slopes, one size does not always fit all. It may be necessary to calibrate the percentage of disturbed area to reflect greater challenges in some terrain than in other areas.

A grading ordinance needs detailed requirements for engineering and geological reports prior to municipal approval of a grading permit, with the reports reviewed by qualified professionals of the jurisdiction's choosing.

- 3) Any development application which proposes to disturb any slope greater than 30 percent shall be based on a detailed site survey including a geologic and engineering analysis prepared by an appropriately licensed professional and must demonstrate that:
 - a) The slope area's ground surface and subsurface area are not prone to instability and failure;
 - b) The proposed development will not cause greater instability or increase the potential for slope failure;
 - c) The proposed development will not increase erosion that removes underlying support or surface material;
 - d) The proposed development will not increase the hazard to adjoining property or structures. (Frisco, Colorado, Development Standards, Section 180-20-O)

GRADING ORDINANCES

Zoning and related land-use controls affect where building is allowed to occur and can serve as important controls on the type and quantity of development in sensitive and hazardous areas. For landslide-prone hillsides, however, zoning is not adequate to control the quality of the site preparation preceding development, and site preparation, in the form of grading and landscaping, will significantly affect the level of hazard in the area both during construction and for years afterwards. The desire to minimize slope instability lies behind the adoption by communities of grading ordinances, which regulate how developers place cuts and fills.

The potential always exists for some detrimental disruption of both the parcels on which building is occurring and neighboring properties, at least in the form of increased erosion and runoff. To offset this problem, a grading ordinance needs detailed requirements for engineering and geological reports prior to municipal approval of a grading permit, with the reports reviewed by qualified professionals of the jurisdiction's choosing.

Olshansky (1996a) notes that such ordinances first gained popularity in the 1950s following a pioneering effort by the city and county of Los Angeles. Since then, with the subsequent help of the Uniform Building Code and a statewide requirement in California, such ordinances have become widespread, with a commonly accepted format. Variations deal with the degree of slope to which specific requirements apply, including technical evaluations, with steeper slopes attracting stricter regulatory treatment. Figure 3-2 illustrates the grading guidelines in use in Los Angeles County.

The following Olympia, Washington, ordinance excerpt is relatively simple and straightforward, spelling out conditions for a grading permit:

An application for a grading permit shall be submitted on a form provided by the city. Accompanying such form shall be a general plot plan which shall include the following information.

1. General vicinity map:

- a) Property boundaries indicating extent and location of proposed grading activities, and major physical features of the property (i.e., streams, ravines, etc.)
- b) Location and dimensions of buffer areas to be maintained or established, and location and description of proposed erosion-control devices or structures
- c) Identification and location of all trees that are to be retained and protected.

2. As determined at the discretion of the building official, other information as deemed appropriate to this chapter may be required in instances related to geological hazard, shoreline protection, tree protection and replacement or project scope.

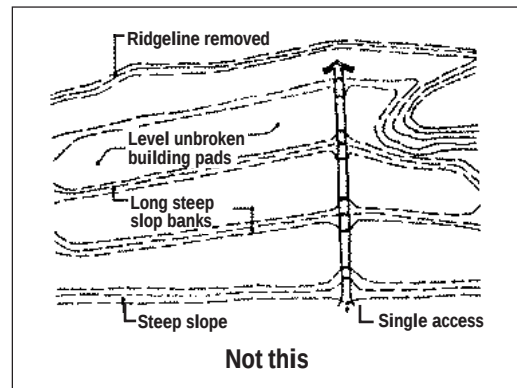
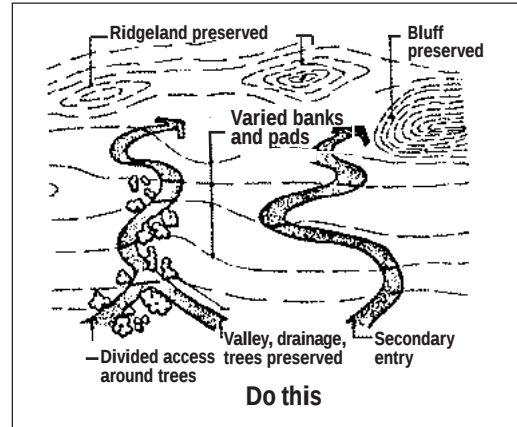
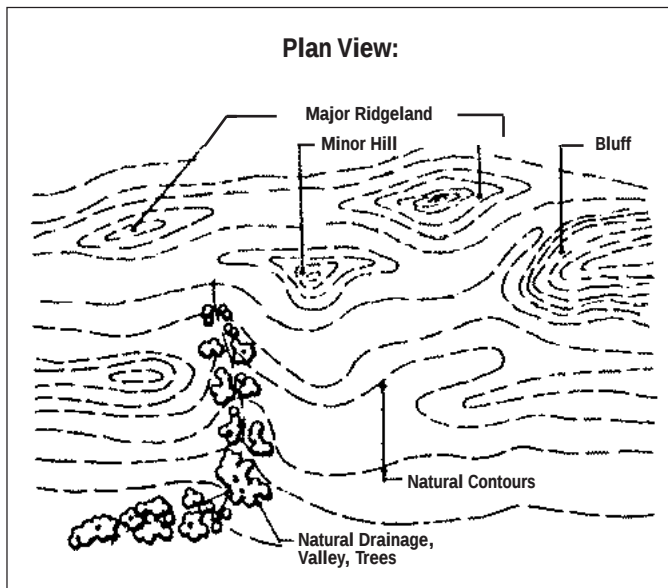
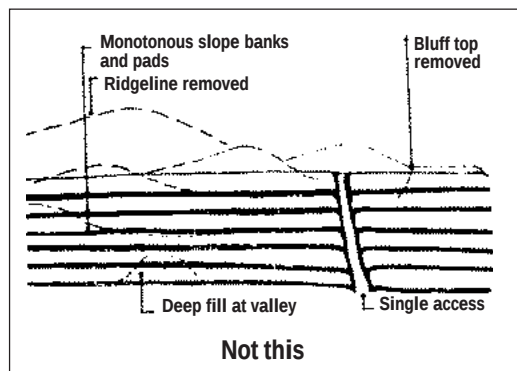
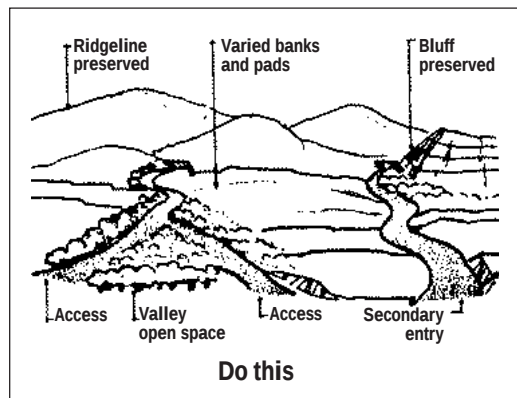
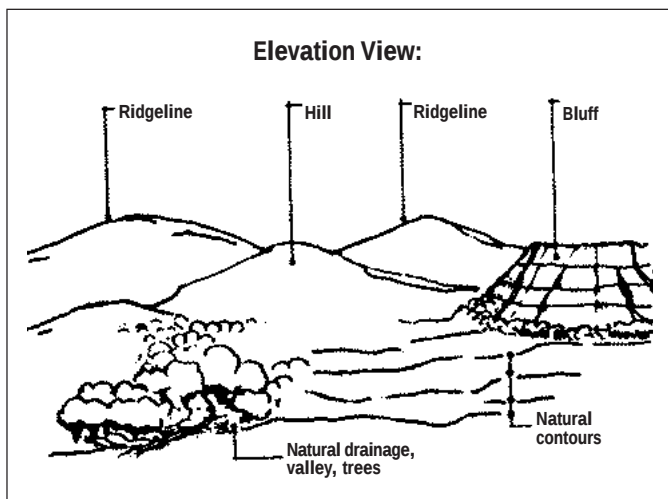


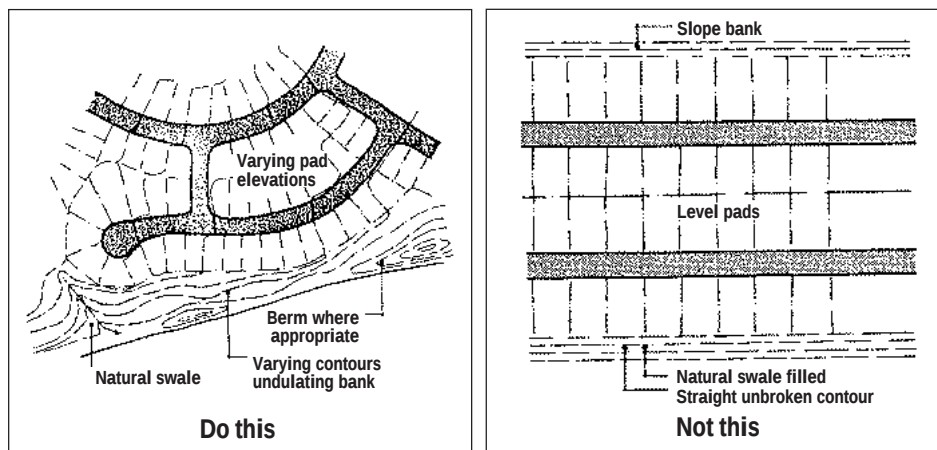
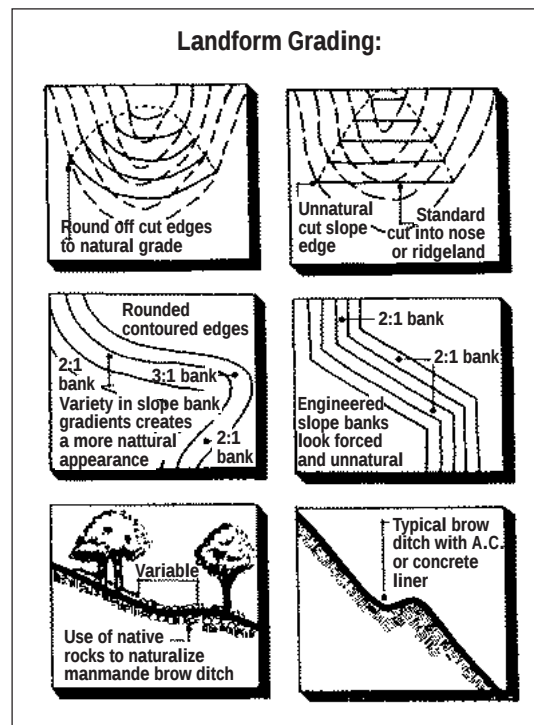
Figure 3-2. Grading guidelines, Los Angeles County, California.



Source: Los Angeles County, *Hillside Design Guidelines*

- A. Grading should minimize disturbance to the natural landform, not destroy visual quality and community character nor create conditions that result in landslides, flooding, or erosion.
- B. No grading shall take place in a known or suspected hazardous areas as determined by the Department of Public Works without a geological survey and / or other data and tests as requested. No grading shall take place in a Significant Ecological Area (SEA), unless an Environmental or Archaeological Report is submitted. . . . Grading in an SEA area should generally be avoided.
- C. Good grading design must be exercised for safety as well as aesthetics and should incorporate the following measures:
 1. Utilization of land form or contour measures to produce cut-and-fill slopes compatible with existing land character. Continuous unbroken slope surfaces that are visible from offsite are discouraged.
 2. Graded slopes contoured by varying slope increments and undulating banks vertically and horizontally.
 3. Varied cut-and-fill banks and drainage terrace spacing to alleviate monotony and allow random landscaping.
 4. Berms at top of slopes and other locations used to screen, vary profile, and insure drainage away from slopes.
 5. A drainage plan devised to direct flow to streets or approved collector systems that will be maintained by a public agency or maintenance district.
 6. Varied pad elevations above street level to avoid appearance of monotonous, flat, level pads.
 7. Creation of views from hillside sites.
 8. Slopes less steep than 2-to-1 are encouraged and may not require drainage systems, if approved by the Department of Public Works.
 9. Cuts and fills in excess of 50-feet depth are discouraged.

Figure 3-2 (continued):
Grading guidelines, Los Angeles
County, California.



Source: Los Angeles County, *Hillside Design Guidelines*

3. An application fee of \$25.00 for the grading of one acre or less, plus \$10.00 for each additional acre or portion thereof.
4. The building official upon receipt of an application shall confer with the city environmental review officer and other city personnel as may be appropriate, and make a decision within 20 working days from the date of submission of a completed application, unless an extension is authorized by the applicant.
5. Any permit granted under this chapter shall expire one year from the date of issuance. Upon a showing of good cause, a permit may be extended by the building official for one six-month period.
6. Approved plans shall not be amended without authorization of the building official. The permit may be suspended or revoked by the building official because of incorrect information supplied or any violation of the provisions of this chapter.
7. No work shall commence until permit notice is posted by the city on the subject site and two other locations for a period of 10 days prior to commencement of grading activities.
8. An application penalty fee triple that assessed by subsection (A)(3) of this section shall be assessed for any grading or clearing conducted prior to issuance of a grading permit required by this chapter. This application penalty fee shall be in addition to any penalty assessed under Section 16.48.120. (Olympia, Washington, Clearing and Grading Ordinance)

It is often critical that mechanisms be established to guarantee the ongoing maintenance of slope stability over time once building is complete and the structures are occupied.

MAINTENANCE REQUIREMENTS

No matter how excellent the grading and construction on a site, completion of a development project does not end the story. It is often critical that mechanisms be established to guarantee the ongoing maintenance of slope stability over time once building is complete and the structures are occupied. These requirements for ongoing maintenance are often built into deed restrictions for landowners or the restrictive covenants of homeowners associations. These agreements can cover such vital concerns as water use, drainage, landscaping, and the installation of various hard mitigation measures (e.g., retaining walls), and are often spelled out in one or more of the other ordinances discussed in this chapter.

The technical details of slope stability maintenance can become quite technical and generally require expert geotechnical assistance to determine the most effective approach, particularly for mitigation options in the aftermath of a landslide. An excellent practical guide to remedial and preventative measures for landslide-prone areas is Cornforth's *Landslides in Practice* (2005), which details both methods and a dozen case studies.

SUBDIVISION AND PLANNED UNIT DEVELOPMENT STANDARDS

Subdivision is the process of splitting a larger parcel into any number of smaller parcels as a means of facilitating development. Communities regulate the subdivision process not only because it goes to the very heart of defining property rights for subsequent owners, but because the resulting pattern of development necessitates the installation of infrastructure and the extension of city or county services to maintain that infrastructure, including roads, water lines, and sewer lines. In addition, private utilities, such as electric, telephone, and gas companies, will need to establish rights-of-way for the extension of their own wires and pipelines. All of this needs to be coordinated to produce desirable land-use results, which is the entire purpose of having planning staff and the local planning commission review subdivision proposals. Major subdivisions, in particular, can have significant long-term consequences for municipal budgets and service demands, not to mention impacts on the overall quality of life for the community.

GARFIELD COUNTY, COLORADO

Fire and rain preceded a massive landslide that occurred during the busy Labor Day weekend in 1994 and buried a section of Interstate 70 near Glenwood Springs, Colorado. The slide occurred on Storm King Mountain, located in Garfield County, where the highway runs along the banks of the Colorado River. A wildfire first cleared the soil-stabilizing vegetation on the slopes of the mountain. Then an intense rainstorm saturated the mountain slope, triggering a slide that blocked the highway with earth and debris several feet deep. The force from the debris flow pushed 30 cars into the Colorado River below. Stranded traffic caused serious delays for ambulances and other emergency vehicles; the blocked highway cut off access to a local hospital and disrupted traffic across the Rockies in Colorado (NOAA 2002).

Landslides and debris flows are not uncommon along Colorado's I-70 corridor. USGS scientists, with the help of experts from the Colorado Geological Survey and the Colorado Department of Transportation, now remotely monitor the area for movements using specialized sensors. They analyze real-time data collected on slides, rock fall areas, ridge-spreading movements, rock glaciers, and soil ripples in combination with historical data about the rates of movement, rainfall, and snow accumulation in the area (Coe 1997).

Garfield County's comprehensive plan, subdivision ordinance, and zoning regulations deal with geology and soil stability issues in a variety of ways. Recent proposed amendments to the plan recommend examining soil and site-specific hazards and incorporating the findings in development proposals (Draft Comprehensive Plan, Region 5, March 2002). The subdivision regulations restrict platting to open space use only in areas of natural hazards, such as falling rock, landslides, snow slides, or mud flows. For uses other than open space, the regulations require that mitigation measures, certified by a professional engineer registered in Colorado, accompany the platting application (Garfield County Subdivision Regulations, Section 9:12). In the zoning ordinance, the planned unit development (PUD) regulations require a licensed engineer to evaluate natural hazards, including potential landslide areas. In the Resource Lands zoning district, which includes areas identified as having talus slopes or gentle sloping areas, some additional restrictions apply.

One relatively universal solution for subdivision in any kind of hazardous area is clustering.

Although planned unit developments (PUDs) are addressed in special, separate ordinance provisions, the review of PUD plans still involves the same sort of process as the review of a subdivision site plan to ensure the proper placement of elements and infrastructure and compliance with code provisions; many of the same precautions with regard to landslide hazards apply to planning for both subdivisions and PUDs. Unlike most subdivisions, however, PUDs typically involve some mix of commercial and other uses, including residential, and often occur on redevelopment sites.

In either case, as challenging as the planning process can sometimes be in relatively flat and safe areas, it becomes more complex when some or all of the land being subdivided contains natural hazards. Landslide hazards present a particular challenge for ensuring the safety and survivability of infrastructure. Leaking water lines, for instance, can easily contribute to slope failure, and slope failure can in turn contribute to the collapse of the water lines. The planner's job in the face of this knowledge must be to ensure that such facilities are located to minimize the potential for catastrophic failure and the infrastructure is durable enough to withstand anticipated pressures. For example, many southeastern coastal communities have placed power lines underground in order to eliminate their exposure to high winds from hurricanes that could result in power failures. Identifying precisely both the location and potential severity of hazards will merit the submission of a geotechnical report by a qualified expert before a final plat is approved.

One relatively universal solution for subdivision in any kind of hazardous area is clustering. (See Figure 3-3.) This tool basically allows develop-

ers to retain the overall allowable density for their land while avoiding building on the most dangerous areas within the overall parcel being subdivided. Clustering is essentially a transfer of density within the property to create smaller lots or to build more units on more acceptable portions of the subdivision while retaining more problematic or sensitive areas as permanent open space. The technique has been used extensively to preserve rural or small town aesthetics and natural and cultural resources (Arendt 1994). It is eminently applicable, however, to situations like carving out subdivisions on land that includes a floodplain by locating lots away from the flood hazard area, maintaining the floodplain itself as open space (Morris 1997). This principle is embodied in the following PUD provisions:

No public roads shall be located within high-hazard areas and no building permits for residential, commercial or industrial uses will be issued within the high-hazard areas, as shown on the Avalanche Overlay maps or site-specific avalanche studies. All density accumulated by ownership of these lands is transferable to contiguous land in the same ownership which is not located in a high-hazard area. However, the transfer of density is not guaranteed and shall be allowed only if the Commission and the Board find it in conformance with the purposes and standards of the Planned Unit Development ordinance. (Blaine County, Idaho, Title 9 Zoning Regulations, Chapter 22 Avalanche Overlay District: High-Hazard Areas)

Where known hazards exist, the subdivision scheme should include a road layout that facilitates evacuation, including multiple points of access for emergency vehicles, a point increasingly stressed for areas prone to wildfire hazards (Schwab and Meck 2005). Many areas prone to landslides may also be subject to other hazards, in which case all of them must be addressed in a comprehensive set of solutions so that the solution to one problem does not serve to exacerbate another. Special considerations for placement in nonhazardous or less hazardous portions of a subdivision should also apply to entrance points and to facilities, such as schools or community centers where large numbers of people might be expected to congregate, if these are part of the original plat. In other cases, special consideration may be needed for physical mitigation of existing landslide hazards, such as retaining walls and seepage barriers, although at the time of platting, the emphasis should remain on avoidance to the maximum extent possible.

TRANSFER OF DEVELOPMENT RIGHTS

Transfer of development rights (TDR) provides a means of transferring permitted development densities from one area where development is considered undesirable to another where it is considered more appropriate. The device is often used to preserve sensitive lands or to aid other environmental objectives, such as protecting water quality in Lake Tahoe from runoff in the surrounding watershed. In hazardous areas, the objective is to provide property owners a means to reclaim value by transferring density to an area less vulnerable to damage from earthquakes, landslides, or other natural hazards. Such a regulatory system invariably requires the designation of both a sending area and a receiving area. Communities using TDR must define the boundaries in both areas and establish the limits of what may be transferred by the participants in the deal. The system may operate purely on the private market, within the guidelines established by the jurisdiction, or may be operated directly by local government as the manager of the transactions. In the former case, the transactions must still be recorded with the local government. Due to its inherent complexity, TDR is by nature an approach that requires both technical expertise and administrative capacity in the local government creating the program.

Many areas prone to landslides may also be subject to other hazards, in which case all of them must be addressed in a comprehensive set of solutions so that the solution to one problem does not serve to exacerbate another.

The community must also establish what it considers a reasonable accommodation so development densities in the receiving area are consistent with the goals of the comprehensive plan. Hence, not all development potential (e.g., uses, densities, and structure types) needs to be transferred. TDR systems are a market-based approach to the protection of sensitive lands because they accomplish the community's goals insofar as a market exists for the transfer of economic interests in the land.

TDR is also dependent in most cases on state enabling legislation to provide local authority to enact such programs. The enabling legislation can impose restrictions on how the program may operate.

Finally, the value of the program for local government may depend on the nature and size of the land areas in question, whether TDR can noticeably contribute to solving the problem, and whether the community has an existing TDR program for some purpose other than mitigating landslide hazards. Expanding an existing program to include landslide hazard areas may be easier than launching one from scratch.

As in Tacoma, Washington, it is not uncommon for such a program to serve multiple environmental purposes:

For residential development proposals on lands containing fish and wildlife habitat conservation areas, erosion hazard areas, landslide hazard areas, or steep slopes, the density that would have been allowed in the critical area and buffer but for the provisions of this chapter is generally transferred to the remainder of the site not in the critical area or buffer. For residential development proposals on lands containing wetland or stream buffers, the density that would have been allowed in the buffer but for the provisions of this chapter is generally transferred to the remainder of the site not in the critical area or buffer. For wetlands and streams, density credits do not apply to the portion of the site occupied by the critical area. The allowable number of dwelling units shall be determined using the following formula, table, 125 percent maximum density rule and setback provisions.

The formula for determining the number of dwelling units allowed after the application of density credits is as follows:

$$\text{Dwelling units allowed on site} = \frac{(\text{CA} \times \text{DC} + \text{DA})}{\text{MLS}}$$

Where:

CA = Critical Acreage

DC = Density Credit

DA = Developable Acreage

MLS = Minimum Lot Size

(Tacoma, Washington, Land Use Regulatory Code, Chapter 13.11: Critical Areas Preservation, Section 13.11.070)

TABLE OF DENSITY CREDITS

Percentage of Site in Critical Area and/or Buffer	Density Credit
1-10%	100%
11-20%	90%
21-30%	80%
31-40%	70%
41-50%	60%
51-60%	50%
61-70%	40%
71-80%	30%
81-90%	20%
91-99%	10%

Communities can also choose to restrict the densities transferable through TDR on the basis of criteria designated in the ordinance. In other words, the community can differentiate between the qualities of the land, developing those standards based on rational presumptions, without treating all land equally. For example, certain lands can be more highly valued for transfer of density credits than others, as is indicated in Table 3-2.

**TABLE 3-2. CALCULATING MAXIMUM RESIDENTIAL DENSITY
ON SENSITIVE LANDS**

Type of land to be set aside	Percent of land that may be used to transfer density
Wetlands and wetland buffers	100%
Unstable slope	0%
Hillsides of 0-40% slope	100%
Hillsides of 40%+ slope	30%
Streams and watercourses and buffers	0%
Archaeological or historical sites	100%
Open space network	100% (if the open space network contains sensitive areas, then the density transfer shall be based on the percentages given for the sensitive areas).
Natural open space	100% (if the open space network contains sensitive areas, then the density transfer shall be based on the percentages given for the sensitive areas).
Recreational open space	A 20% density bonus is given for planned developments.

Source: Camas, Washington, Zoning Ordinance, Chapter 18.09: R1 Density and Dimensions, Section 18.09.060).

Communities can also choose to restrict the densities transferable through TDR on the basis of criteria designated in the ordinance.

BONDS AND INSURANCE

Insurance is a temporary form of liability protection usually applicable to the period of construction or some other period of limited duration. Construction bonds may typically begin with the date of the construction permit (including any grading permits that may be required prior to site plan approval) and end on the date of issuance of an occupancy permit. Bonds and sureties have a fixed performance period after which the deposit is forfeited if the project is not complete. The period may depend on local construction practices. The intent is to ensure adequate performance by the developer. The requirements are spelled out in local development ordinances.

When a grading permit is required under this ordinance, developers shall provide the town with a bond or other acceptable security which places the town in an assured position to do or to contract to do the necessary work to cover, restore, and landscape exposed fills and cuts to blend with the surrounding natural terrain. The minimum acceptable bond shall be in a dollar amount equal to the number of total cubic yards of cut and fill multiplied by fifteen, or in such greater amount as deemed appropriate by the Town. The bond shall be in such form as deemed appropriate by the Town. In the event that construction has not commenced within six months from the date of issuance of the grading permit or restoration is not complete within 24 months from the date of issuance of the grading permit, such bond shall be forfeited to the Town in such amount necessary for restoring the construction site to its original condition and all authorized permits shall be revoked and become void. (Cave Creek, Arizona, Zoning Ordinance, Article 16-4 Development Standards, Section 12 Hillsides)

The details of charges for bonds and insurance during construction phases need to be spelled out, especially if the amount is a function of size or duration of the project.

Many communities have consolidated their hillside regulations into a single, unified ordinance with provisions addressing the issues of zoning, site plan review, grading, maintenance requirements, and infrastructure policies.

The details of charges for bonds and insurance during construction phases need to be spelled out, especially if the amount is a function of size or duration of the project. The rates are based on easily verifiable criteria, such as size, length of construction, and cost of construction.

Performance or maintenance bonds are required in the amount of 120 percent of the cost of the project. The percent of the bonds may be increased by the director and the bonds may be waived only by the director. See BIMC 16.20.140 for additional bonding requirements. (Bainbridge Island, Washington, Municipal Code, Title 16: Environment; Chapter 16.20: Critical Areas; Section 16.20.110: Mitigation Plan Requirements)

Finally, ordinances also spell out who is reviewing construction progress for compliance and the conditions under which completion of the work is determined and termination and refund of the bond may take place.

A surety bond, in an amount to be determined by the director, executed by a surety company authorized to do business in the state of Washington shall be posted by the applicant to assure the restoration of any areas on the site or in the surrounding area disturbed or damaged by slides during construction, and to ensure completion of the work authorized by the permit, or, if the work is not completed, to assure that the site will be restored to a safe condition. The bond will be exonerated upon occupancy approval or upon final approval of the building permit by the building official. Except for the smallest of jurisdictions, typically the city, county, or village engineer would review these grading plans for bonds and insurance as well. The engineer may then rely on outside experts to assist in the reviews. Experts may come from a regional agency, a state geological survey, or local geotechnical consultants. In any case, the person reviewing these plans, though paid by the developer through the local government, should be independent of the developer's consultants. (Edmonds, Washington, Building Codes, Chapter 91.05: Building Permits—Earth Subsidence and Landslide Hazard Areas; Section 19.05.050: Bonds and Public Liability Insurance)

...

Within 30 days of the completion and final inspection by the city of all provisions of the approved plan, said bond or security shall be refunded or terminated, provided, however, that a maintenance bond no greater than 50 percent nor less than 10 percent of the original bond as determined by the public works director or his designee shall be required for a period of one year to ensure that the permanent vegetation is mature enough to control erosion and to survive seasonal weather conditions. (Brandon, Mississippi, Code of Ordinances, Chapter 34: Environment; Article IV: Land Disturbance and Erosion Control—Performance Bonds)

HILLSIDE DEVELOPMENT ORDINANCES

One common hazard for communities seeking to regulate development in landslide-prone or hillside areas is that of passing a variety of ordinances over time, each targeting a particular portion of the problem, resulting in a piecemeal approach that may even produce some contradictions within the overall code. Fortunately, there is also a common remedy. Many communities have consolidated their hillside regulations into a single, unified ordinance with provisions addressing the issues of zoning, site plan review, grading, maintenance requirements, and infrastructure policies. As Olshansky (1996) has noted, this allows more careful consideration of possible inherent contradictions in public purpose regarding aesthetics, safety, environmental protection, and housing affordability. Deciding how to make trade offs between those goals and values will tend to dictate which approach to regulation makes the most sense and allow the development of an internally consistent and defensible plan and ordinance.



City of Homer

www.cityofhomer-ak.gov

Planning

491 East Pioneer Avenue
Homer, Alaska 99603

Planning@ci.homer.ak.us

(p) 907-235-3106

(f) 907-235-3118

TO: Homer Advisory Planning Commission
FROM: Julie Engebretsen, Deputy City Planner
DATE: December 20, 2017
SUBJECT: 2018 Draft Land Allocation Plan

Background

The Land Allocation Plan is a catalogue of City owned properties. Each year, the City Council reviews and approves which city properties should be made available for lease through the Land Allocation Plan. Sometimes Council decides to sell lands, or the Administration brings forward any land management issues that need to be addressed. Each Commission provides comments by memorandum to the Council. Council will consider the comments, and then passes a resolution adopting the draft plan for the year. Typical actions include leasing lands, selling lands, or providing direction to staff on land management problems and opportunities.

Most City leasing occurs on the Spit and at the airport terminal. The Port and Harbor Commission usually provides the most detailed comments about the Spit, as they typically are most familiar with area operations and long term leases.

Changes to the Land Allocation plan:

- With Council approval, the lots on page A-2 will be moved to Port Facilities in section C. These lands are not available for long term lease per previous Council resolutions. But they can be leased for short term use under the Port Tariff.
- The airport is now included, to increase transparency on airport leases and business opportunities.

Requested Actions:

1. Recommend any lands the City should offer for lease, that are not already in Section A.
2. Comment on the Lease Committee recommendations

Lease committee recommendations:

- Make Lot 11 available for lease (A-2). Currently other than the tower lease, the lot is only available for short-term lease.
- Include the following information on each applicable lot: "Prior to a long-term lease the site is appraised. The appraised lease rates for uplands is approximately \$0.90 per square, per annum. Lease rates vary, so contact the Harbor Office at 907-235-3160."

Attachment: 2018 Draft Land Allocation Plan

2018 DRAFT Land Allocation Plan City of Homer

Adopted by Resolution 18-XX



Parking Management on the Homer Spit

Table of Contents

Sections

- A. Lands Available For Lease**
- B. Leased Lands**
- C. Port Facilities**
- D. City Facilities and other city lands**
- E. Parks, Green space, cemeteries**
- F. Bridge Creek Lands**
- G. Conservation Easement Lands**

Index—City lands listed by parcel number (not included in draft)

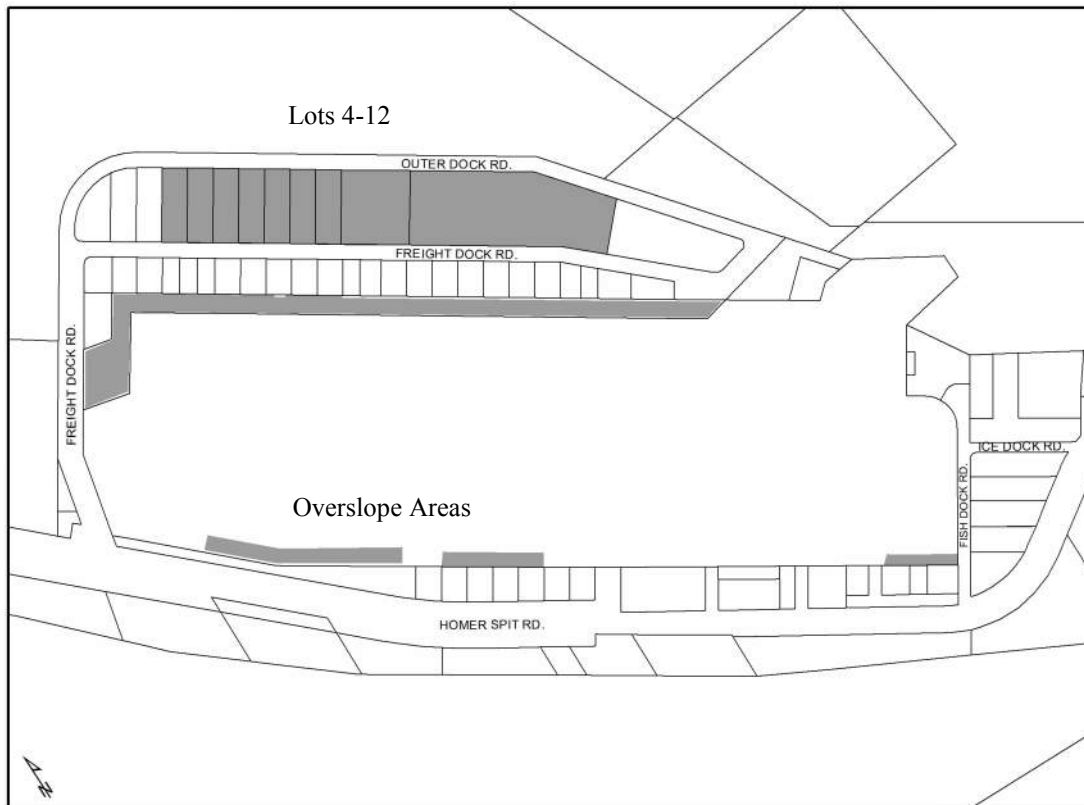
Appendix - Homer Harbor Map

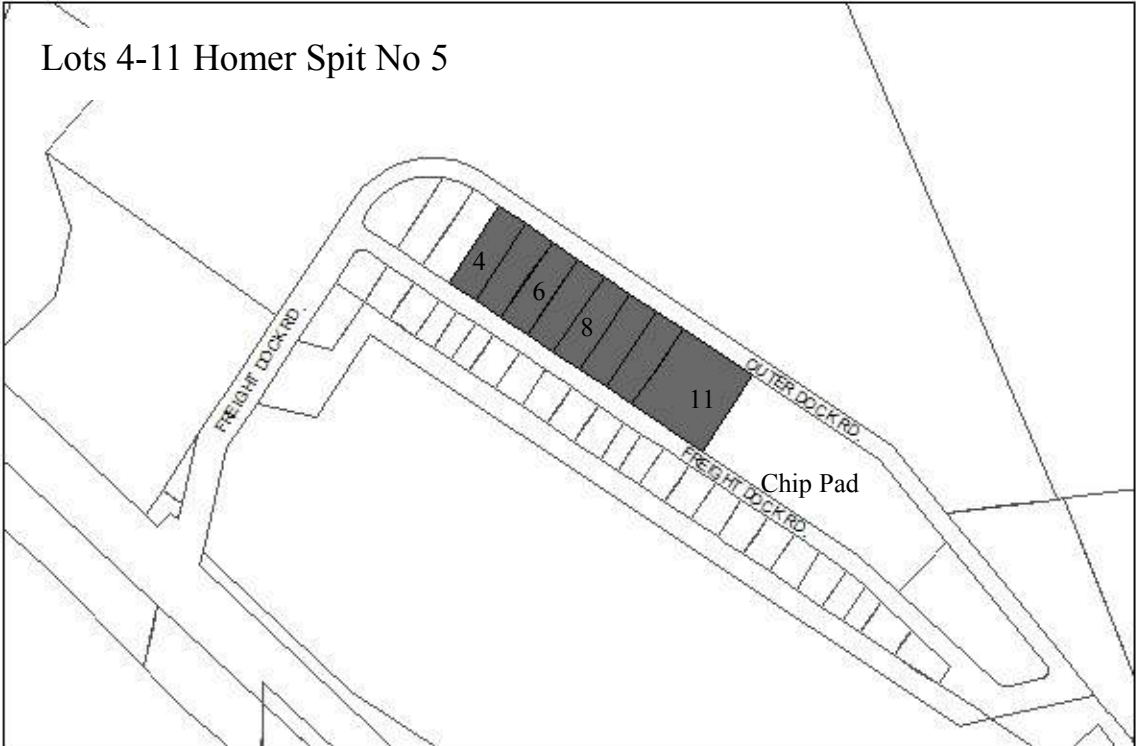
Note: Any lands not included in this document are listed in the previous version of the Land Allocation Plan, and their designations carry forward to this plan.

Section A

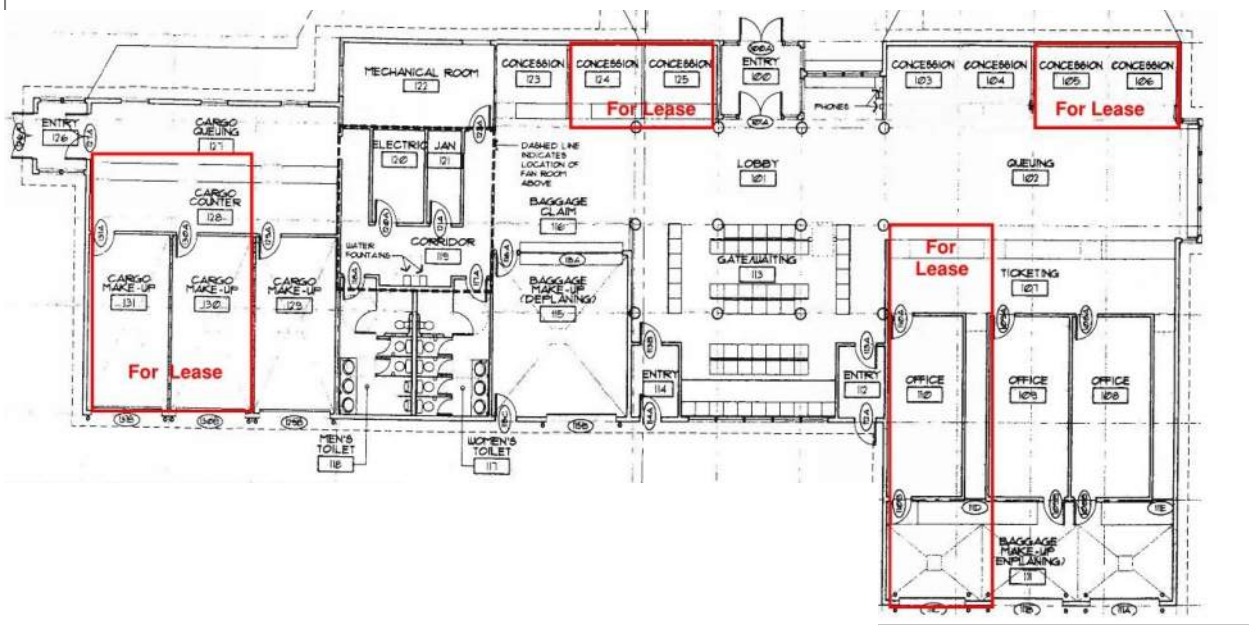
Lands available for lease

The following lots, and select areas within the Homer Airport, are available for lease in 2018. Lease procedures follow the City of Homer Lease Policy, and City Code.



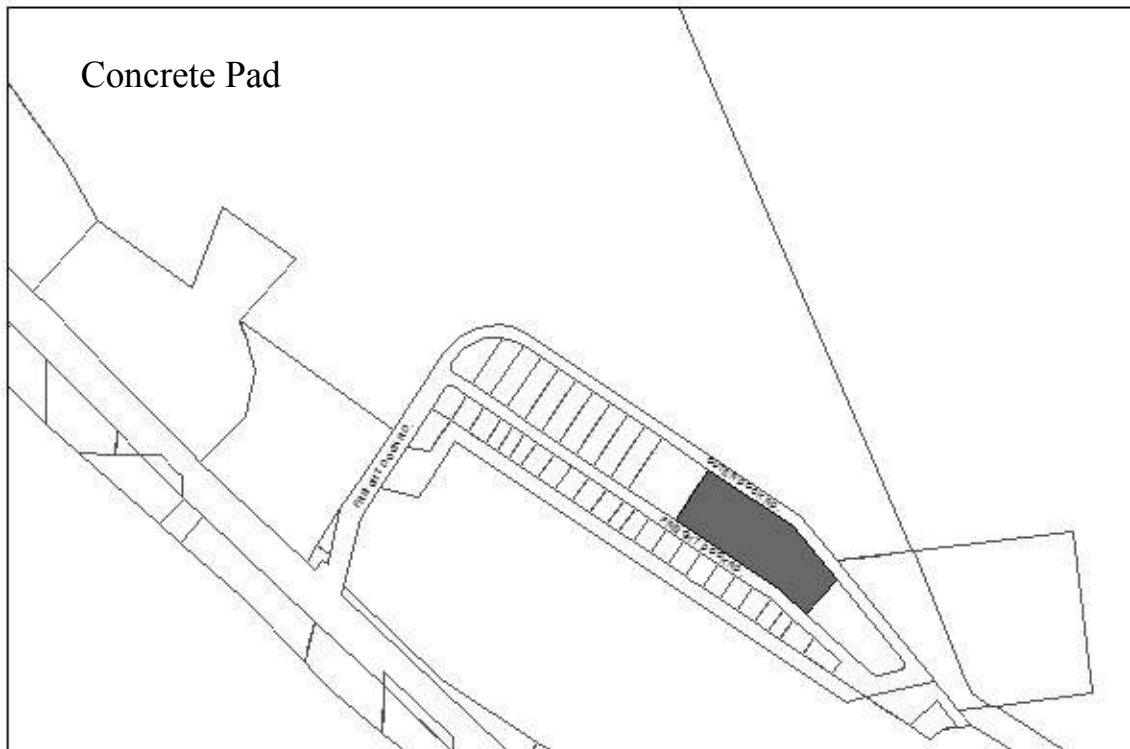
Lots 4-11 Homer Spit No 5 	
Designated Use: Lease Lands Acquisition History:	
Area: 6.47 acres. Small lots are 0.67 acres, large lot is 1.78 acres	Parcel Number: 181032 23-30
2012 Assessed Value: \$1,742,400. Smaller lots valued at \$189,700. One large lot valued at \$414,500	
Legal Description: Homer Spit Subdivision No. 5 Lots 4 through 11	
Zoning: Marine Industrial	
Infrastructure: Water, sewer, paved road access	Address:
Not available for long term lease. Used for seasonal summer parking. May be available for short term winter leases. Resolution 2007-051: Lots 4-10, the RFP process should be delayed until the master parking plan is developed. The East Harbor expansion should be considered. Lot 11: should be held in reserve to attract a container ship/barge operation and/or an industrial support base to the Port of Homer. This should be a long term lease. Resolution 10-35(A) prepare a plan for organized parking and fee collection. Resolution 14-041, Lots 9, 10 and 11 are available for short term lease only. Resolution 15-030(A) A portion of lot 11 to be available for long term cell tower lease.	
Finance Dept. Code:	

Homer Airport Terminal



Designated Use: Airport
Acquisition History:

Finance Dept. Code:



Designated Use: Lease
Acquisition History:

Area: 5 acres

Parcel Number: 18103220

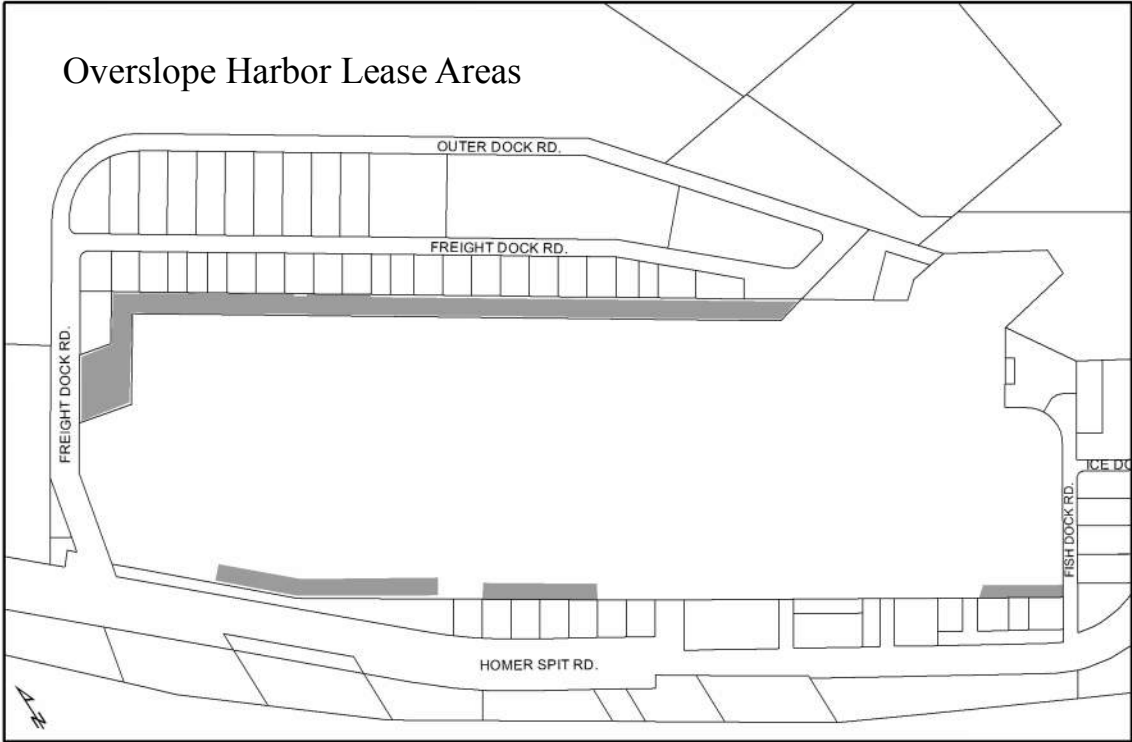
2012 Assessed Value: \$1,487,100 (Land: \$947,100, Structure/Improvements: \$540,000)

Legal Description: Homer Spit Subdivision no 5 Lot 12

Zoning: Marine Industrial

Infrastructure: Water, sewer, paved road access

Address: 4380 Homer Spit Road



Designated Use: Lease
Resolution 17-33

Area:

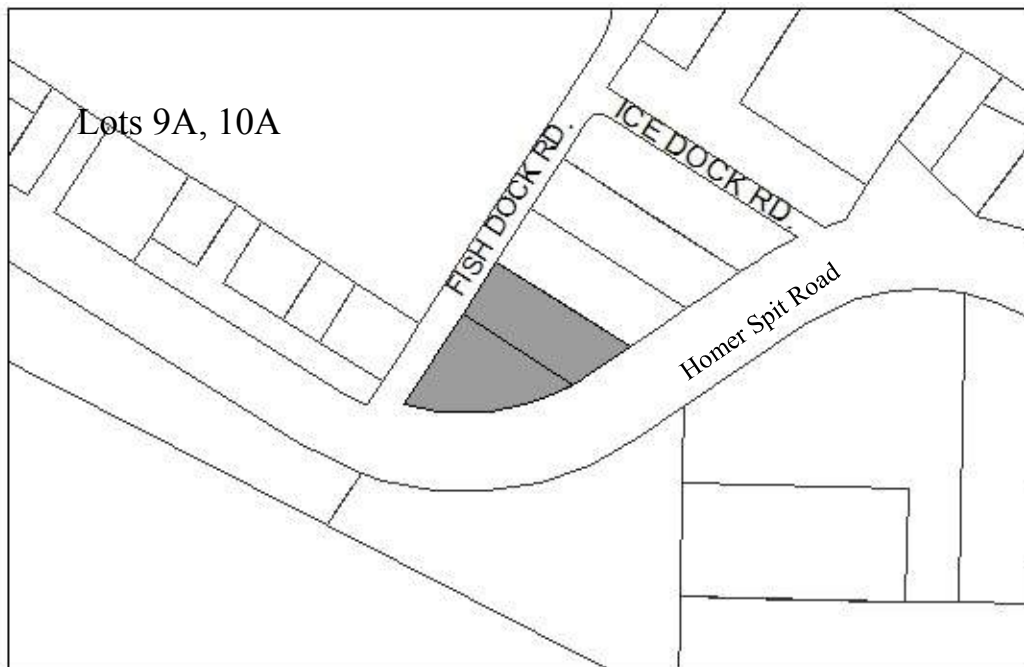
Parcel Number:

Legal Description:

Zoning: Marine Commercial and Small Boat
Harbor Overlay

Infrastructure:

Address:



Designated Use: Leased
Acquisition History:

Area: 1.05 acres (0.52 and 0.53 acres)

Parcel Number: 18103477, 78

2012 Assessed Value: Land value \$312,200

Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM 2007136 HOMER SPIT REPLAT 2006 LOT 9-A and 10A

Zoning: Marine Industrial

Infrastructure: Water, sewer, gas, Spit Trail, paved road access

Address:

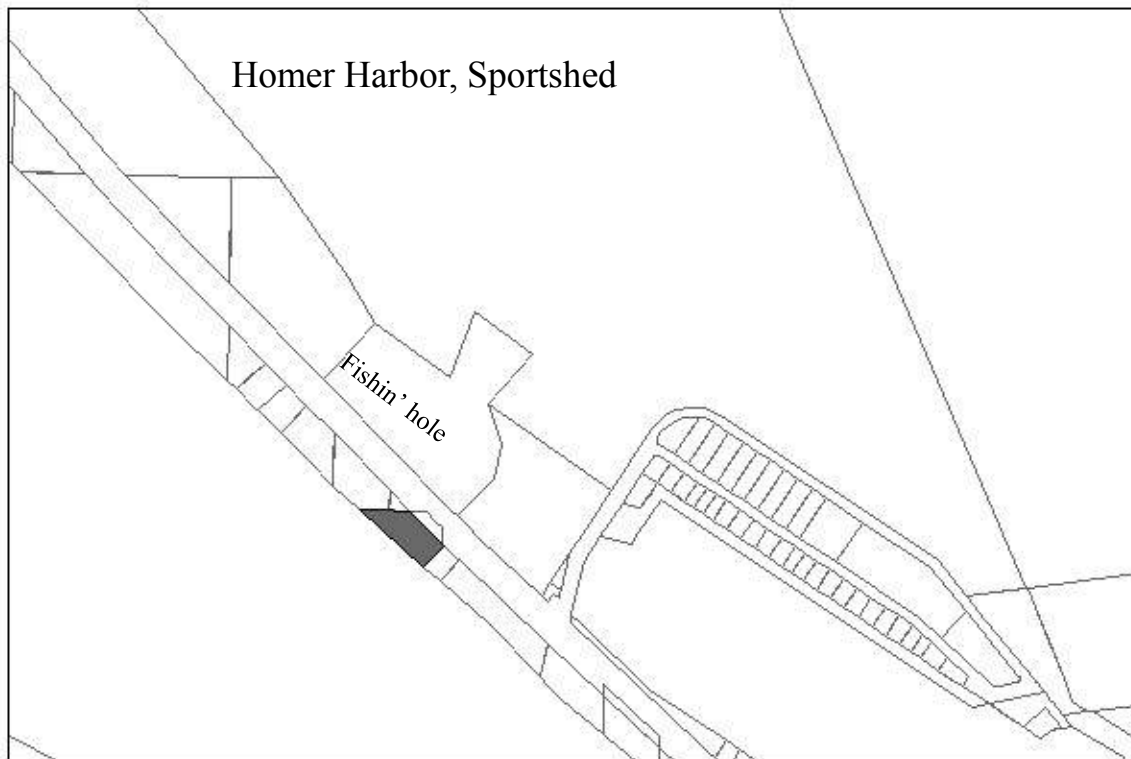
Former Manley building lots.

Finance Dept. Code:

Section B

Leased Lands

These lands are under lease. Leases are based on a current market appraisal provided by a professional appraiser. The Kenai Peninsula Borough tax assessment is given as information only. It is not the basis for lease negotiations or fees. The KPB tax assessor takes into account the duration of the lease. Therefore, when a lease is expiring, the value of the land to the tenant goes down. On leased land, the KPB assessor is NOT showing market value of the land; they use a different measure to create a taxable land value. The tenant pays property tax to the City and Borough. See the Lease Policy Manual for further information. Individual lease files contain information on rents and formal agreements.



Designated Use: Leased Land
Acquisition History:

Area: 1.6 acres

Parcel Number: 18103105

2012 Assessed Value: \$338,500 (Land: \$155,800 Structure: \$182,700)

Legal Description: HM0890034 T06S R13W S35 HOMER SPIT SUB AMENDED LOT 5

Zoning: Marine Commercial

Wetlands: None

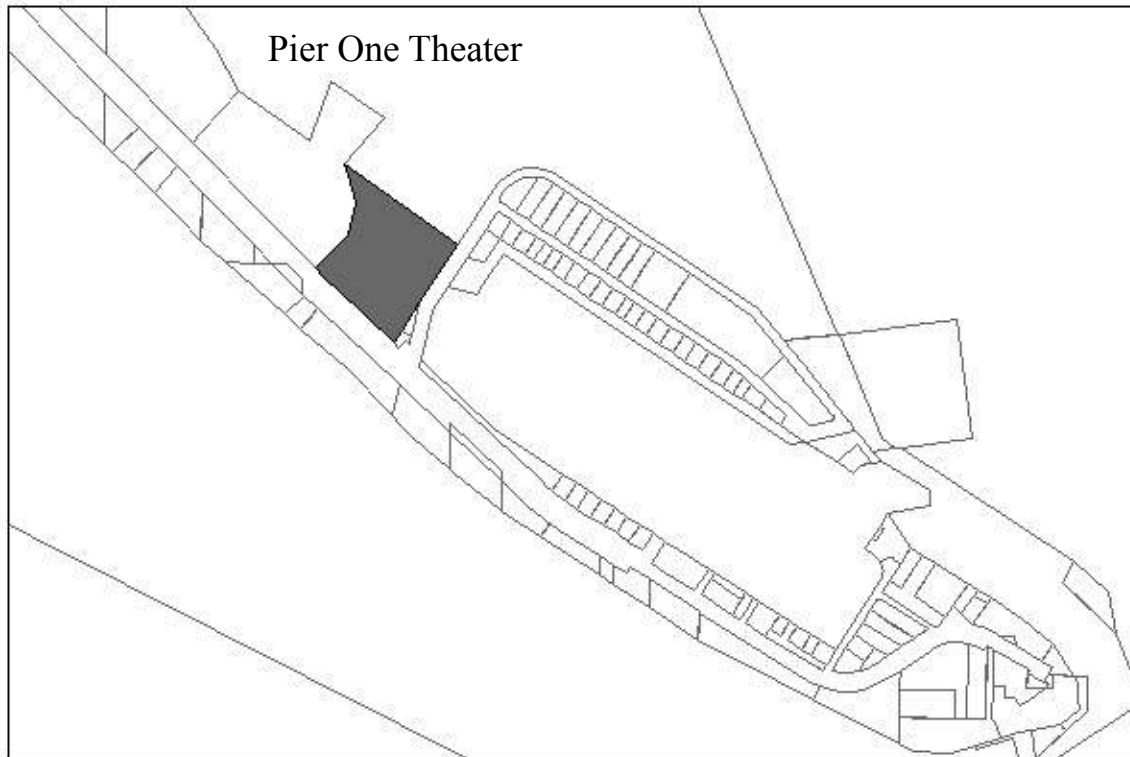
Infrastructure: Paved road, water and sewer.

Address: 3815 Homer Spit Road

Leased to: Sportshed/Homer Enterprises. Resolution 09-25(S), 09-76(S) Sublease
 Expiration: 2029 two 5 year options

Storm damage, fall 2014, resulted in partial collapse and removal of part of one building.

Finance Dept. Code:



Designated Use: Fishing Lagoon

Acquisition History: Ordinance 83-26. Purchase from World Seafood.

Area: 11.27 acres

Parcel Number: 18103117

2012 Assessed Value: \$1,719,900 (Land: \$1,568,000 Structure: \$151,900)

Legal Description: HM0940043 T06S R13W S35 TRACT 1-A THE FISHIN HOLE SUB NO 2

Zoning: Marine Industrial

Wetlands: N/A

Infrastructure: Water, sewer, paved road access

Address: 3854 Homer Spit Road

This is a large parcel that is used several ways.

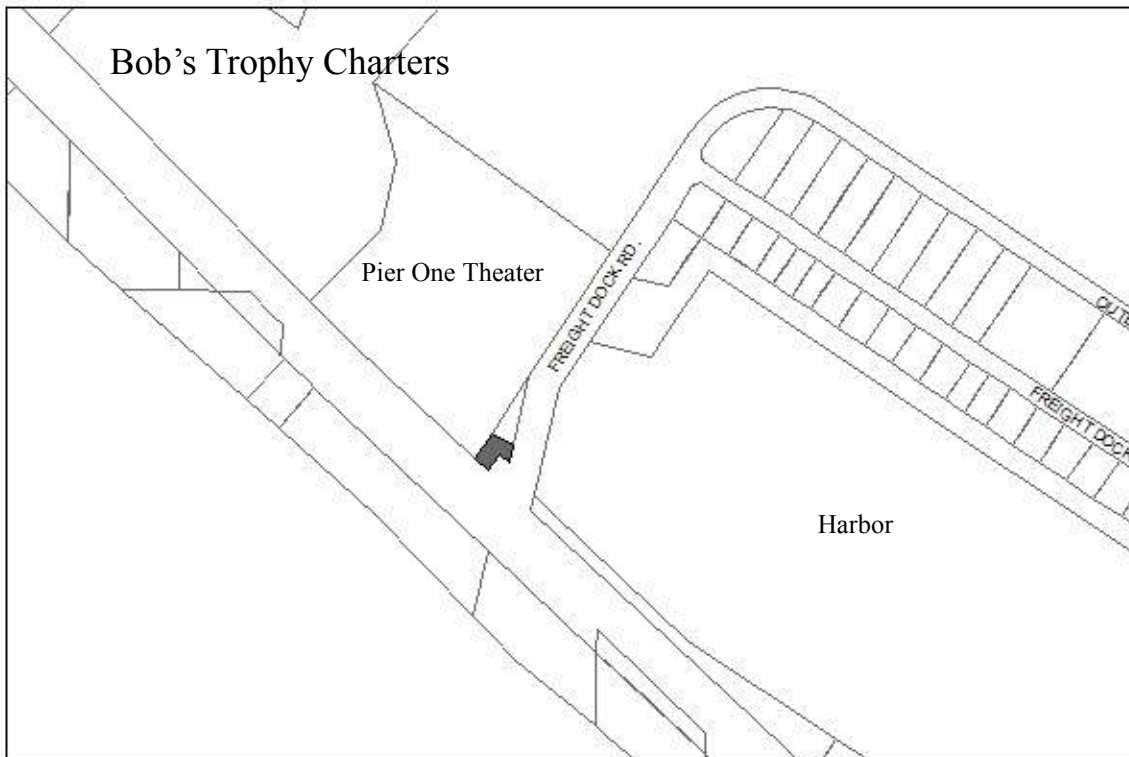
- Dredge spoils dewatering and storage, winter barge haul out activity
- City RV park/campground, and access to the only public RV dump on the spit
- Pier One Theater Lease. Theater leases the building only; not the land. Resolution 89-36A.

Resolution 2011-37(A): Develop a plan which will consider designation of a 10,000 sq. ft. portion to make the land available for Request for Proposals. (in progress)

Resolution 13-020: Designated the north east corner of the lot for use as a trailhead for the Kachemak Bay Water Trail.

Leased to: Pier One Theater
Resolution 2016– 118, 5 Year lease.

Finance Dept. Code:



Designated Use: Lease

Acquisition History: Ord 1983-26. Purchased from World Seafood

Area: 0.15 acres or 6,692 sq ft

Parcel Number: 18103118

2012 Assessed Value: \$117,700 Land \$57,300 Structure \$60,400

Legal Description: HM0940043 T06S R13W S35 TRACT 1-B THE FISHIN HOLE SUB NO 2

Zoning: Marine Commercial

Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 3978 Homer Spit Road

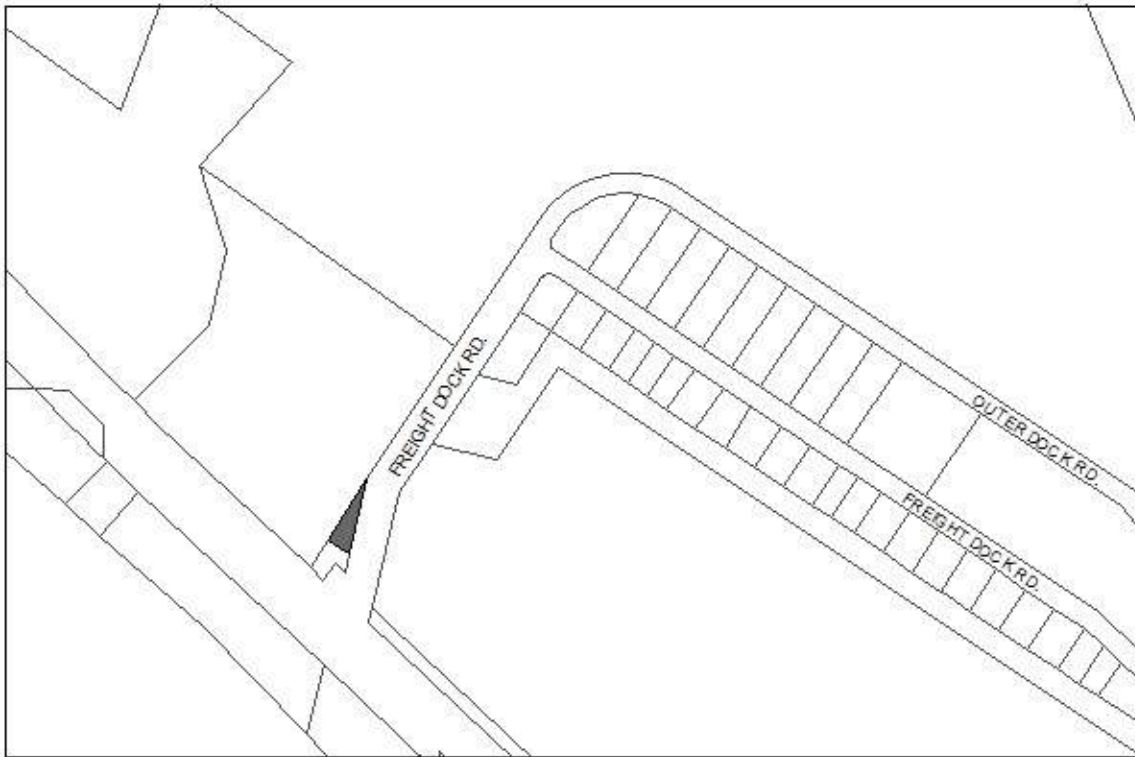
Leased to: Kachemak Corporation (Bob's Trophy Charters)

Expiration: March 31, 2018, no options

Resolution 16-116 authorized a new lease with the new owner for 20 years twith two 5 year options..

Lease expires 2036.

Finance Dept. Code: 400.600.4650



Designated Use: Leased Lands

Acquisition History: Ord 83-26 purchase from World Seafood

Area: 0.18 acres

Parcel Number: 18103119

2012 Assessed Value: \$123,100 (Land: \$66,600 Structure \$56,800)

Legal Description: HM0940043 T06S R13W S35 TRACT 1-C THE FISHIN HOLE SUB NO 2

Zoning: Marine Commercial

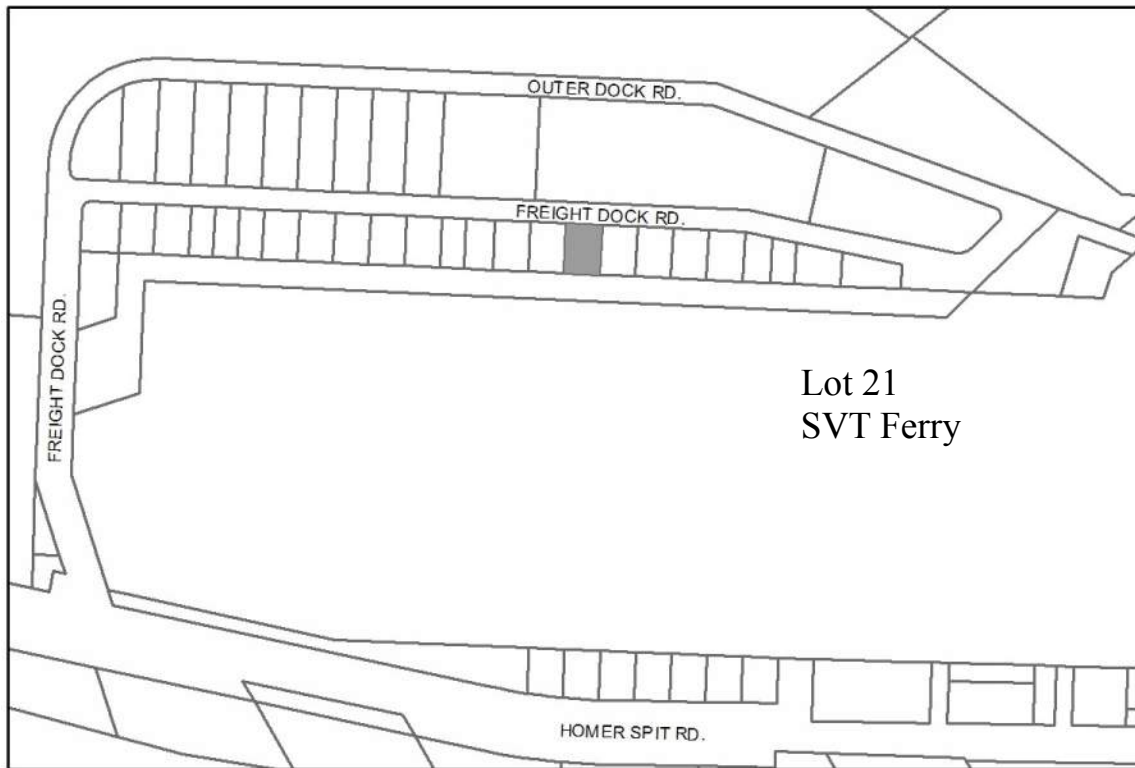
Wetlands: N/A

Infrastructure: Water, sewer, paved road access

Address: 1114 Freight Dock Road

Leased to: L.H. and Marcia Pierce. Sportsman Supply/RV
Expiration: April 1, 2038,.

Finance Dept. Code: 400.600.4650



Designated Use: Leased Lands

Acquisition History:

Area: 0.32 acres

Parcel Number: 18103240

2012 Assessed Value: \$105,000

Legal Description: Homer Spit No 5 Lot 21

Zoning: Marine Industrial

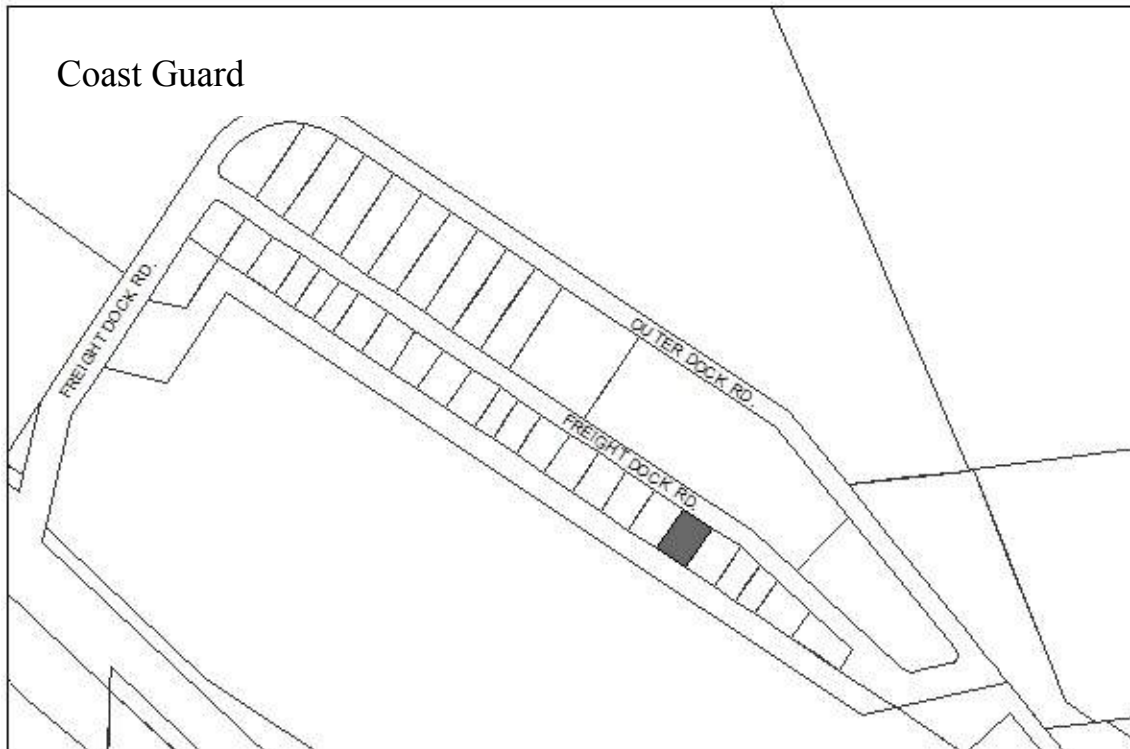
Wetlands: N/A

Infrastructure: Water, sewer, paved road access

Address: 4323 Freight Dock Road

Leased to: Seldovia Village Tribe, for Kachemak Bay Ferry
Resolution 10-41. Expiration May 31, 2030, two 5 year options

Finance Dept. Code: 400.600.4650



Designated Use: Leased to USCG

Acquisition History:

Area: 0.34 acres

Parcel Number: 18103218

2012 Assessed Value: \$567,300 (Land: \$105,000 Structure: \$462,300)

Legal Description: Homer Spit Four subdivision Lot 2

Zoning: Marine Industrial

Wetlands: N/A

Infrastructure: Water, sewer, paved road access

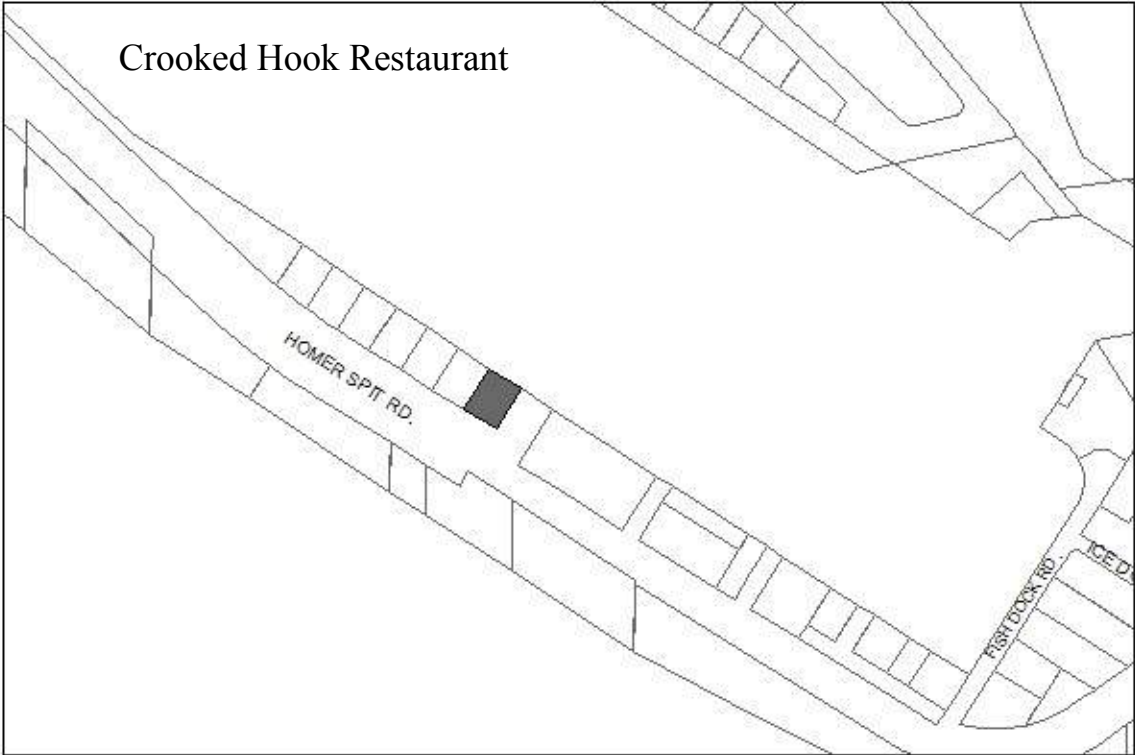
Address: 4373 Freight Dock Rd

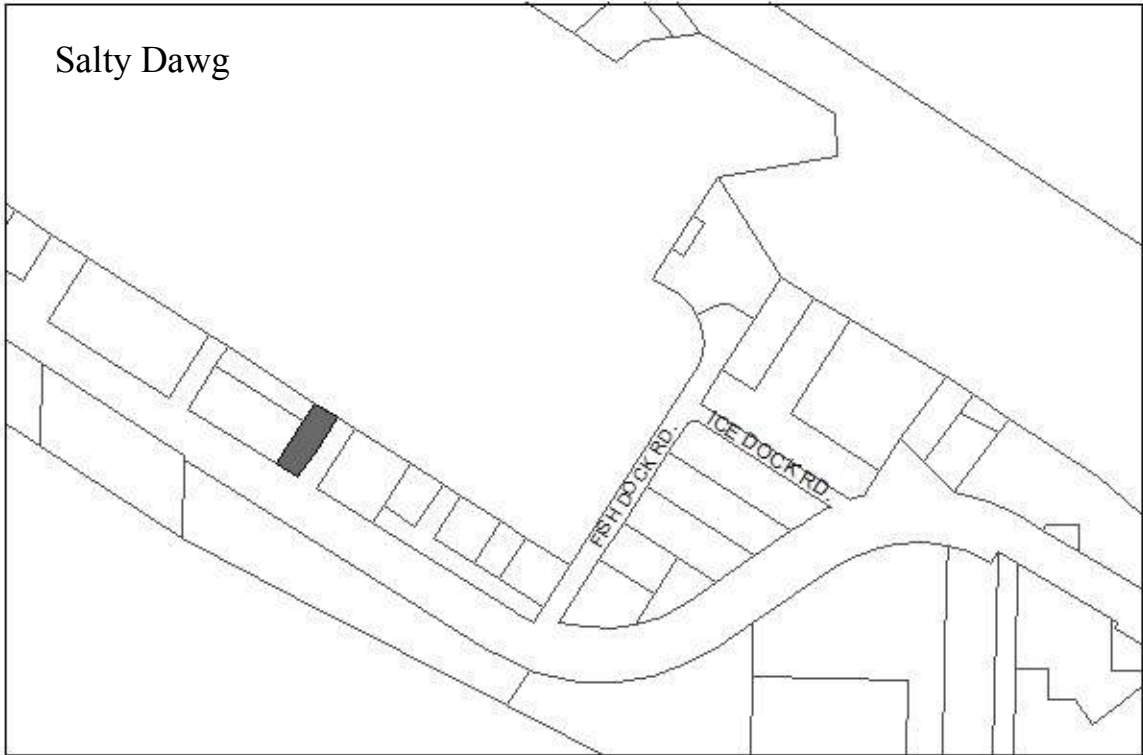
Leased to: USCG

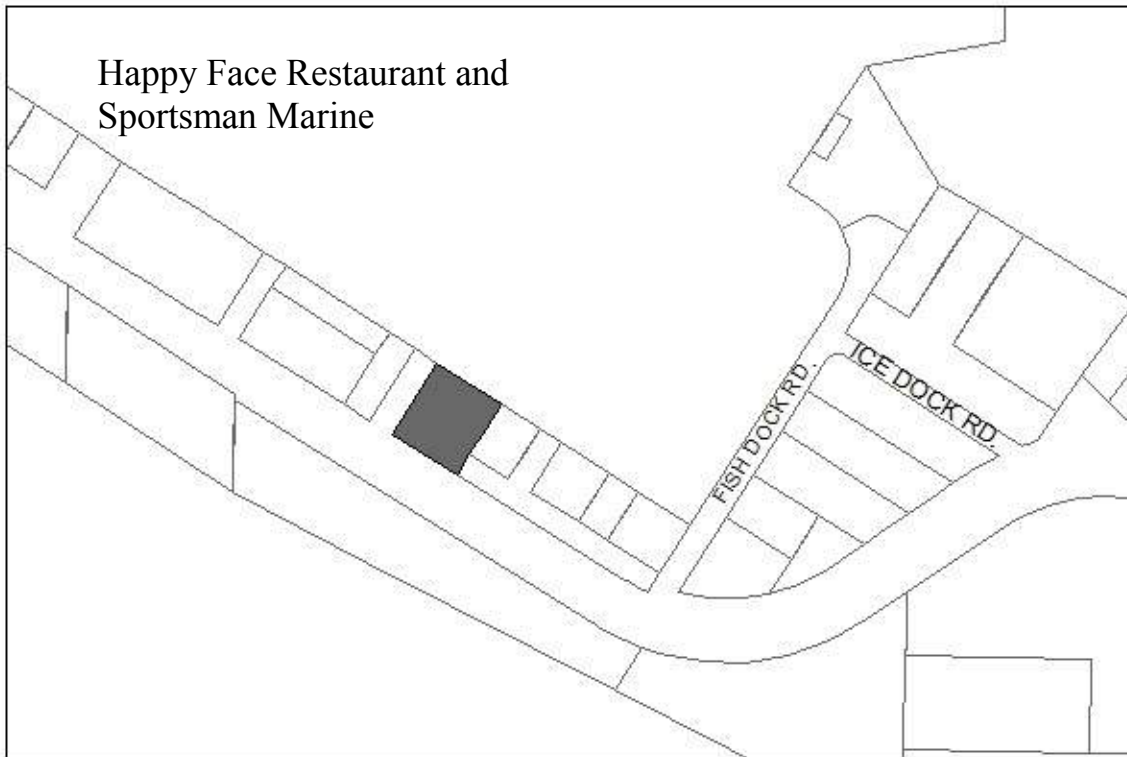
Lease Renewal Options: None

Expiration: September 30, 2026

Finance Dept. Code:

 Crooked Hook Restaurant	
Designated Use: Leased Land Acquisition History:	
Area: 12,700 sq ft	Parcel Number: 18103316
2012 Assessed Value: \$543,400 (Land: \$97,100 Structure: \$446,300)	
Legal Description: HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED LOT 19	
Zoning: Marine Commercial	Wetlands: None
Infrastructure: Paved road, water and sewer	Address: 4262 Homer Spit Road
Leased to: Harbor Bar & Grill Expiration: Lease expires 2/1/2046, no options.	
Finance Dept. Code:	

	
Designated Use: Leased Lands	
Acquisition History:	
Area: 0.23 acres	Parcel Number: 18103309
2009 Assessed Value: \$238,200 (Land: \$80,700 Structure: \$157,500)	
Legal Description: HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED LOT 30	
Zoning: Marine Commercial	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	Address: 4390 Homer Spit Road
Leased to: John Warren, Salty Dawg Expiration: 1/31/2026. No options.	
Finance Dept. Code:	



Designated Use: Leased Land
Acquisition History:

Area: 24,639 sq ft (0.57 acres)

Parcel Number: 18103432

2012 Assessed Value: \$619,800 (Land: \$166,700 Structure: \$453,100)

Legal Description: HM0890034 T07S R13W S01 HOMER SPIT AMENDED LOT 32

Zoning: Marine Commercial

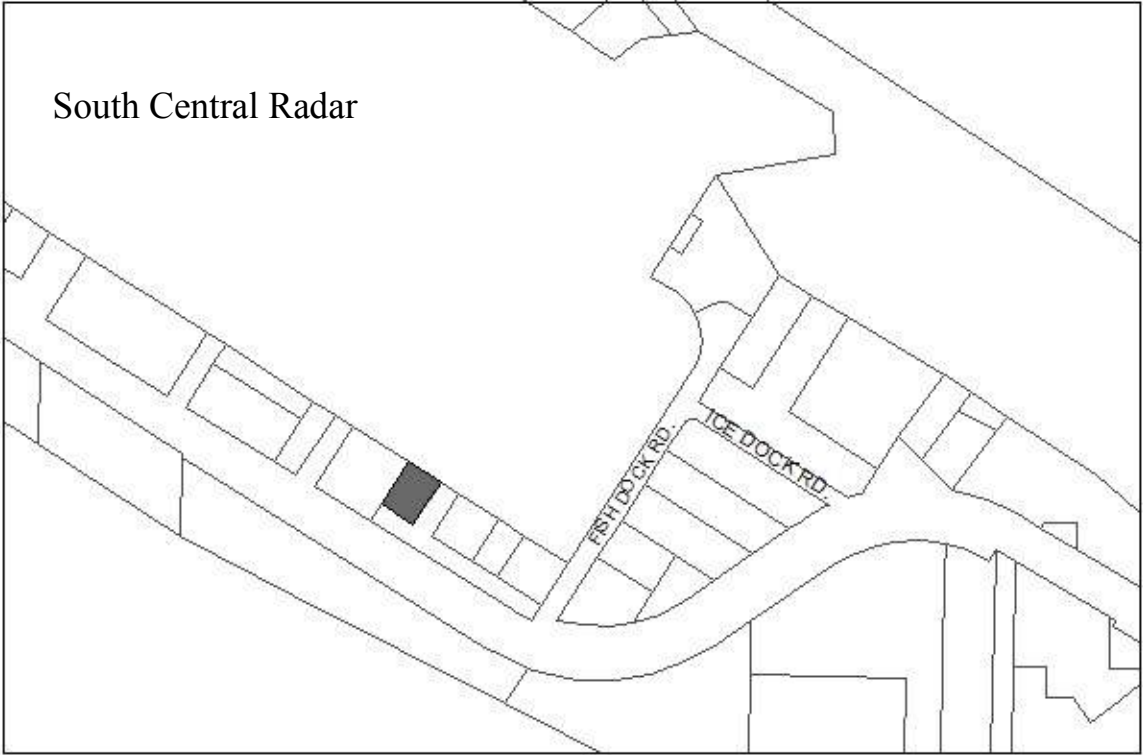
Wetlands: None

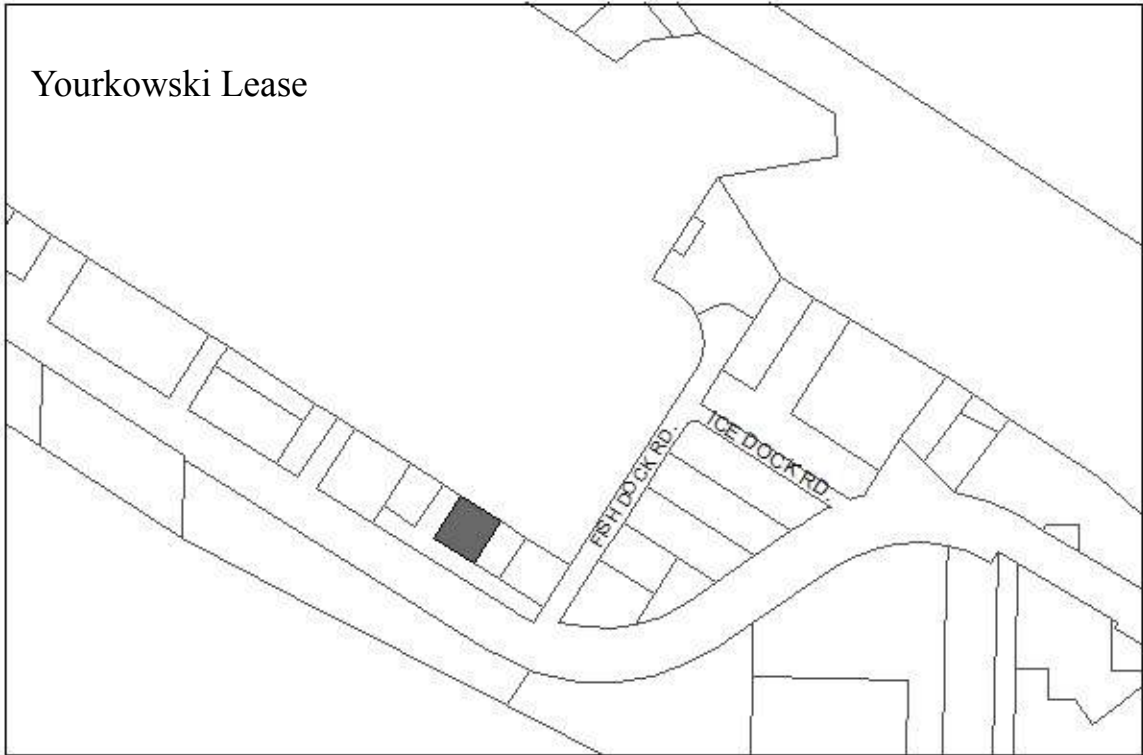
Infrastructure: Paved road, water and sewer.

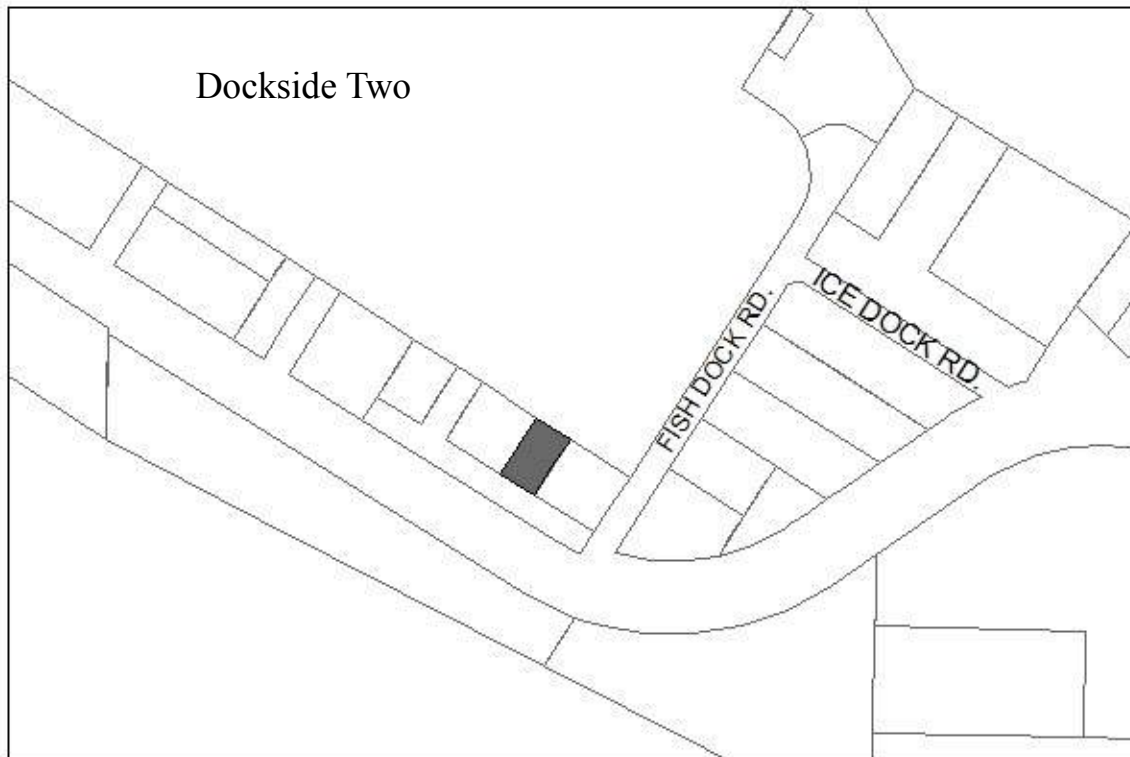
Address: 4400 Homer Spit Road

Leased to: Happy Face Restaurant and Sportsman Marine
 Expiration: 5/15/2034. Two, 5 year options.

Finance Dept. Code:

 South Central Radar	
Designated Use: Leased Land Acquisition History:	
Area: 0.2 acres	Parcel Number: 18103431
2012 Assessed Value: \$162,900 (Land: \$72,100 Structure: \$90,800)	
Legal Description: HM0920050 T07S R13W S01 HOMER SPIT SUB NO TWO AMD LOT 88-1	
Zoning: Marine Commercial	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	Address: 4406 Homer Spit Road
Leased to: Mark & Laura Zeiset dba South Central Radar Expiration: 11/1/2022, two additional 5 year renewal options	
Finance Dept. Code:	

 Yourkowski Lease	
Designated Use: Leased Lands Acquisition History:	
Area: 0.29 acres	Parcel Number: 18103442
2012 Assessed Value: \$277,500 (Land: \$97,100 Structure: \$180,400)	
Legal Description: HM0920050 T07S R13W S01 HOMER SPIT SUB NO TWO AMENDED LOT 88-2	
Zoning: Marine Commercial	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	Address: 4460 Homer Spit Road
Leased to: Mike Yourkowski Lease Renewal Options: one 10 year renewal option. Expiration: 11/30/15, plus renewal option. Leaseholder is exercising options.	
Finance Dept. Code:	



Designated Use: Leased Land
Acquisition History:

Area: 7,749 sq ft. (0.18 acres)

Parcel Number: 18103443

2012 Assessed Value: \$115,400 (Land: \$66,300, Structure: \$49,100)

Legal Description: HM0920050 T07S R13W S01 HOMER SPIT SUB NO TWO AMENDED LOT 88-3

Zoning: Marine Commercial

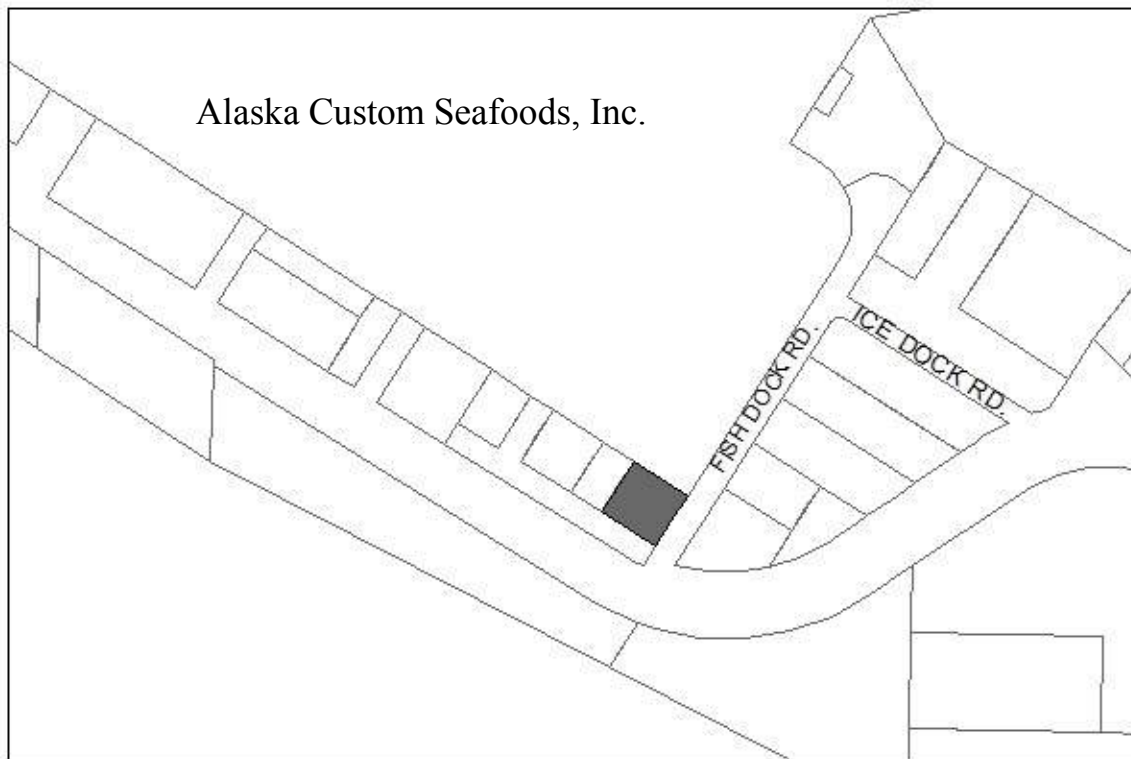
Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 4470 Homer Spit Road

Leased to: William Sullivan dba Dockside Two dba Kachemak Bay Seafoods
 Expiration: 2027, no options.

Finance Dept. Code:



Designated Use: Leased land
Acquisition History:

Area: 0.31 acres, or 13,383 sq ft

Parcel Number: 18103444

2012 Assessed Value: \$222,400 Land Value - \$102,400 Structure Value - \$120,000

Legal Description: HM0920050 T07S R13W S01 HOMER SPIT SUB NO TWO AMENDED LOT 88-4

Zoning: Marine Commercial

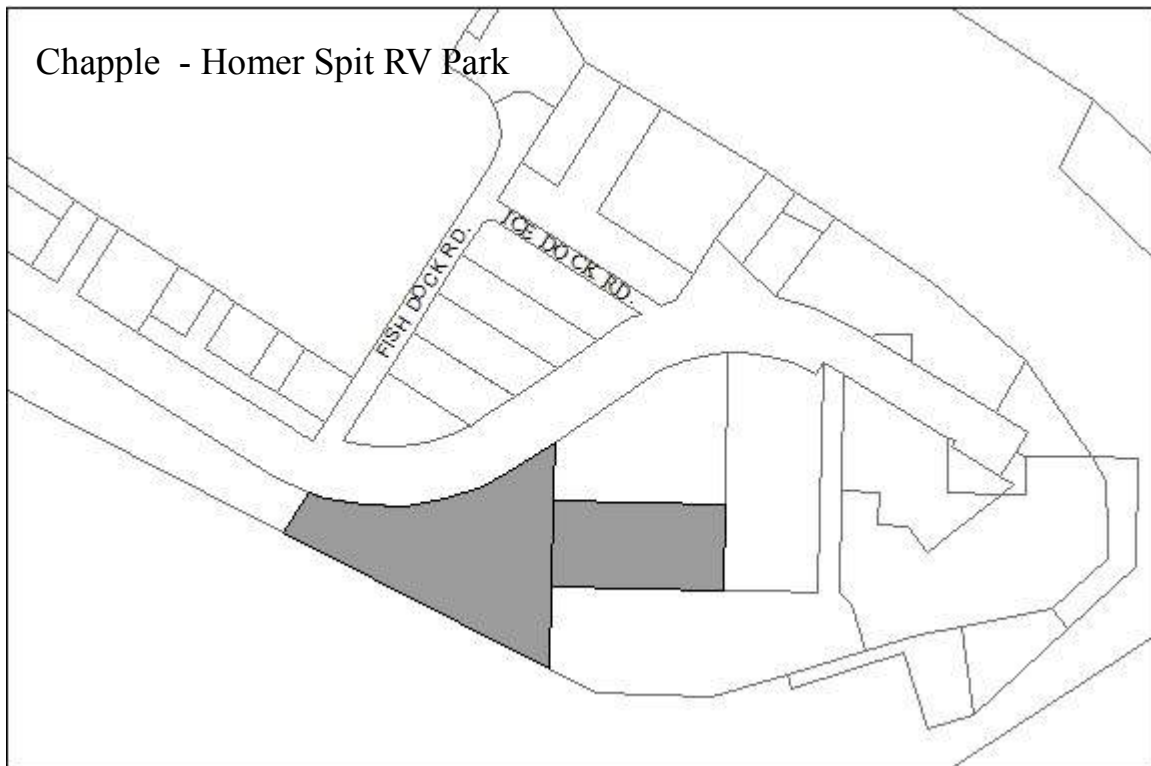
Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 4474 Homer Spit Road

Leased to: Brad Faulkner DBA Alaska Custom Seafoods, Inc. Expires 2043.

Finance Dept. Code:



Designated Use: Leased Land
Acquisition History:

Area: 192,970 sq ft

Parcel Number: 18103402, 03

2009 Assessed Value: Total: \$593,400 Land: \$474,600 Structures: \$118,800

Legal Description: HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED LOT 50.
 HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED LOT 49 EXCLUDING THAT PORTION AS
 PER LICENSE AGREEMENT 205/928.

Zoning: Marine Industrial

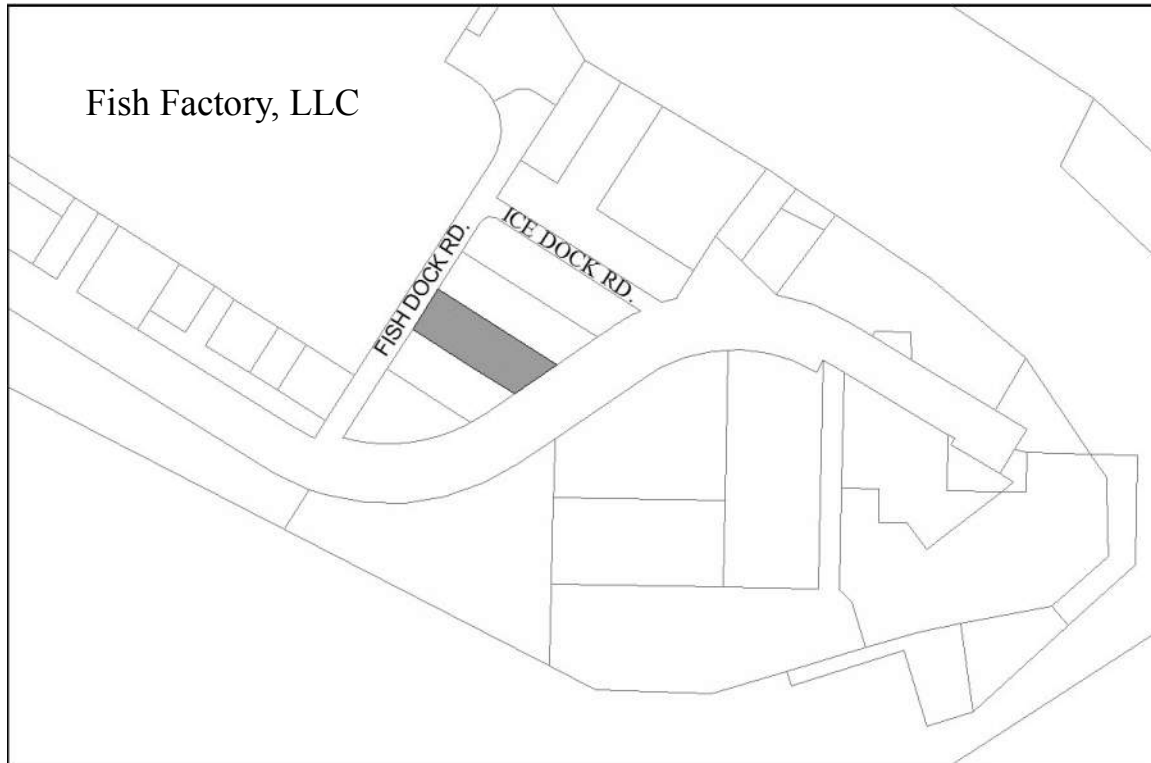
Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 4535 Homer Spit Road

Leased to: John & Margaret Chapple. Homer Spit Campground
 Expiration: 12/31/2026, two addition 3 year options.

Finance Dept. Code: 400.600.4650



Designated Use: Leased Land
Acquisition History:

Area: 27,470 sq ft (0.63 acres)

Parcel Number: 18103421

2012 Assessed Value: \$841,900 (Land: \$180,600 Structure: \$661,300)

Legal Description: HM0900052 T07S R13W S01 CITY OF HOMER PORT INDUSTRIAL NO 3
 LOT 12-A1

Zoning: Marine Industrial

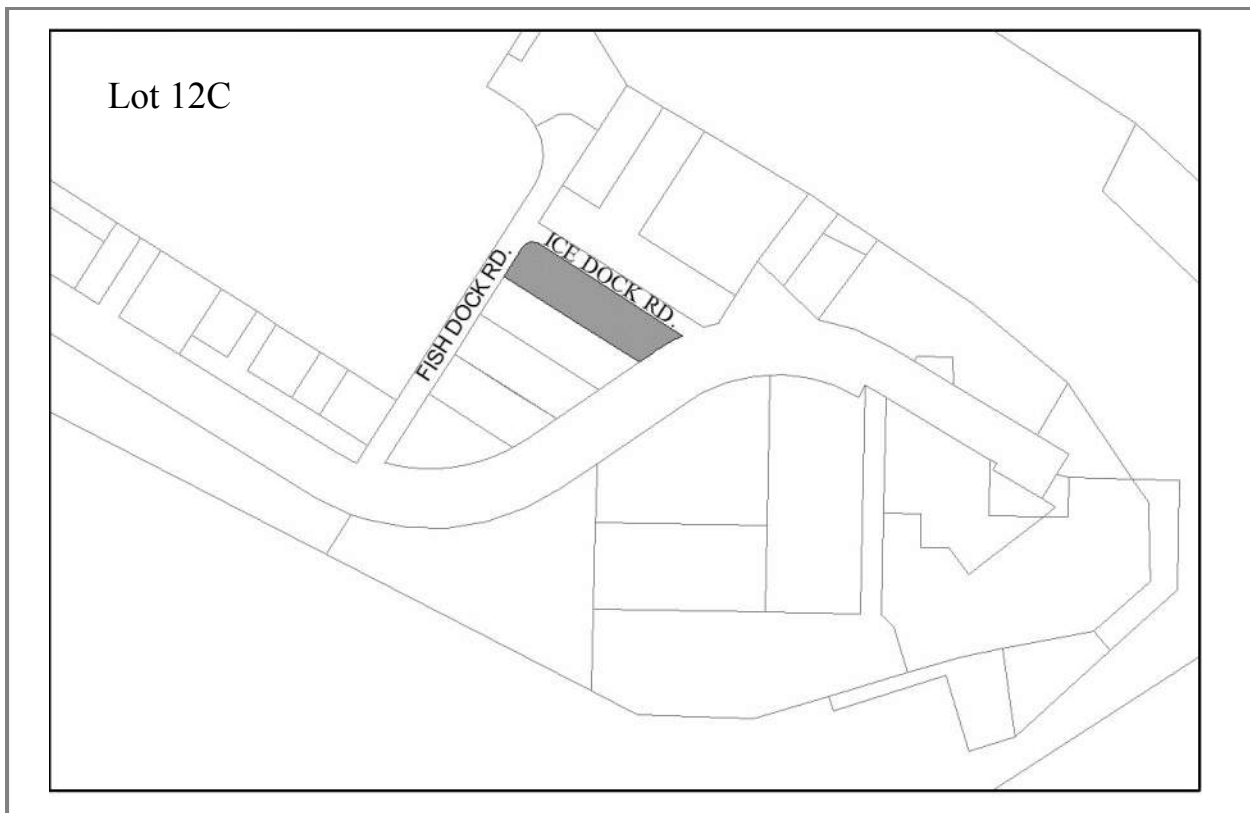
Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 800 Fish Dock Road

Leased to: Fish Factory, LLC
 Expiration: 3/31/2020 with two 10 year options

Finance Dept. Code:



Designated Use: Lease land
Acquisition History:

Area: 0.79 Acres

Parcel Number: 18103452

2012 Assessed Value: \$802,000 (Land: \$216,400 Structure: \$586,300)

Legal Description: City of Homer Port Industrial No 2 Lot 12C

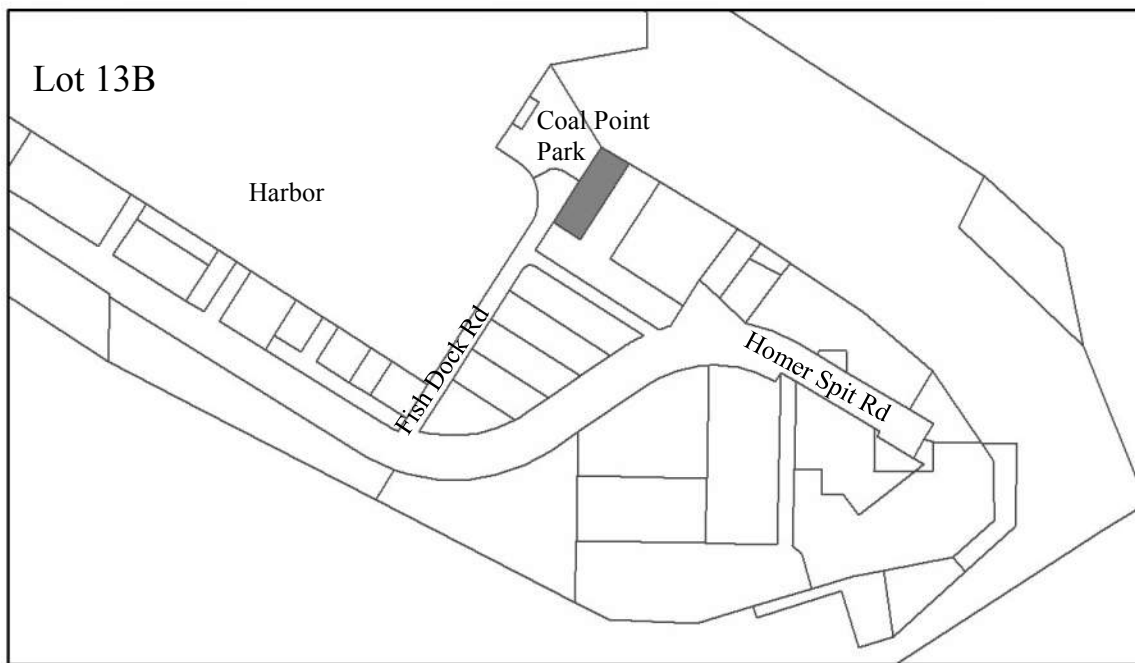
Zoning: Marine Industrial

Infrastructure: Water, sewer, paved road access

Address: 4501 Ice Dock Road

Leased by Resolution 2008-37 to Harbor Leasing (Auction Block)
 Expiration: 3/31/2028
 Options: two additional 5 year options

Finance Dept. Code:



Designated Use: Lease
Acquisition History:

Area: 0.52 acres

Parcel Number: 18103425

2012 Assessed Value: \$194,400

Legal Description: City of Homer Port Industrial Subdivision No 2 Lot 13B

Zoning: Marine Industrial

Wetlands: N/A

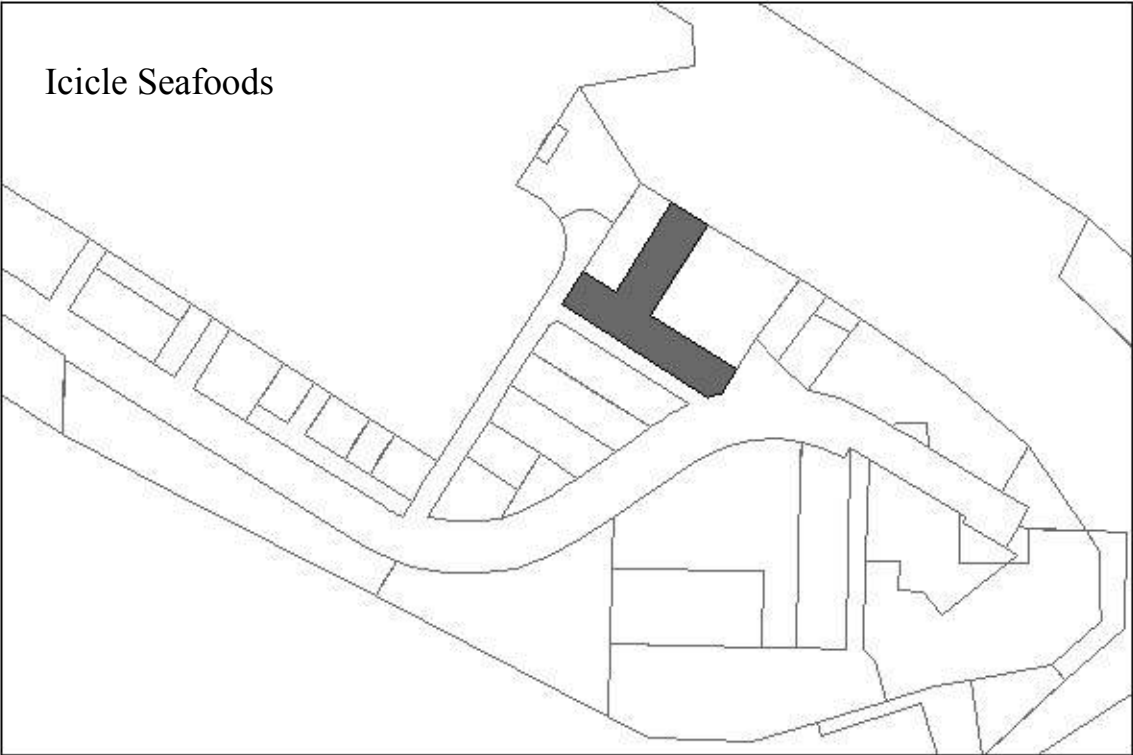
Infrastructure: Water, sewer, paved/gravel road access

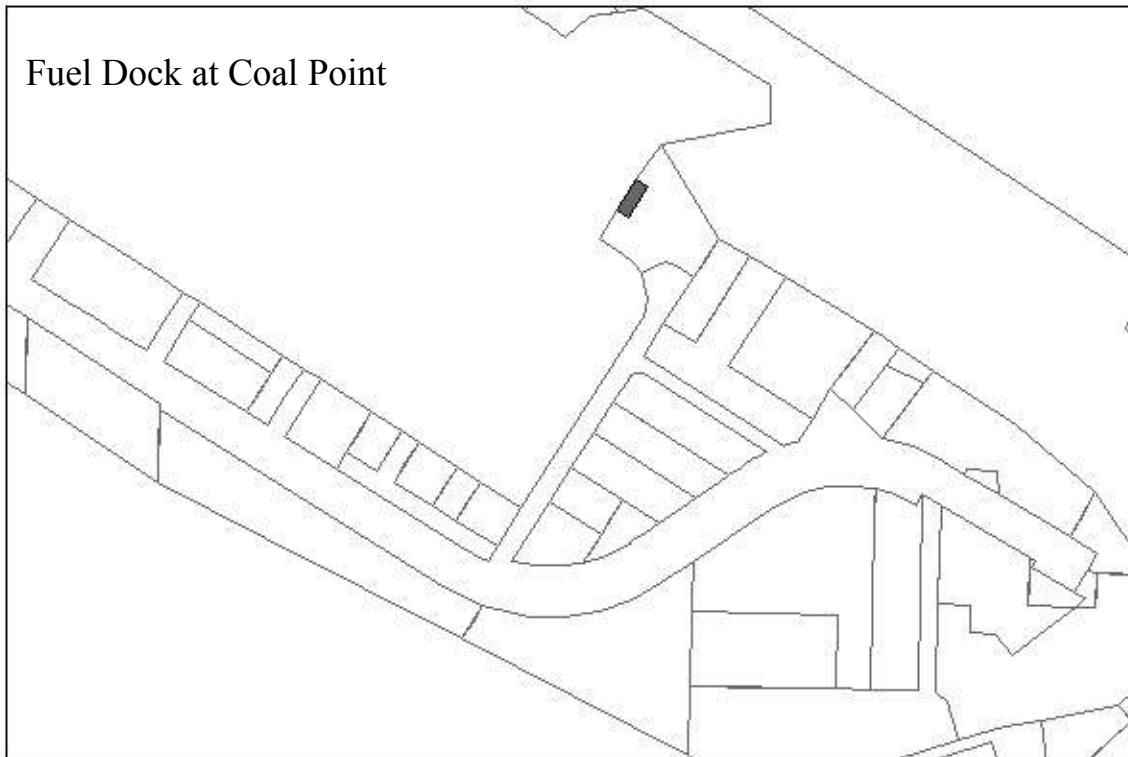
Address: Fish Dock Road

Former Porpoise Room lot. Fisheries use encouraged but not required.

Resolution 14-043, 20 year lease with two five year options. Snug Harbor.
 Expiration: 4/30/2034

Finance Dept. Code:

	
Designated Use: Leased Land	
Acquisition History:	
Area: 1.49 acres	Parcel Number: 18103419
2012 Assessed Value: \$534,900 (Land: \$359,600 Structure: \$175,300)	
Legal Description: HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED ADL 18009 LOT 41 (ADL 18009)	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	Address: 842 Fish Dock Road
Leased to: Icicle Seafoods, Inc Expiration: 2037 with options..	
Finance Dept. Code:	



Designated Use: Leased Land
Acquisition History:

Area: 0.07 acres

Parcel Number: 18103427

2012 Assessed Value: \$476,100 (Land: \$31,100 Structure: \$476,100)

Legal Description: HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED THAT PORTION OF COAL POINT MONUMENT PARK AS PER LEASE AGREEMENT 187 @ 921

Zoning: Marine Industrial

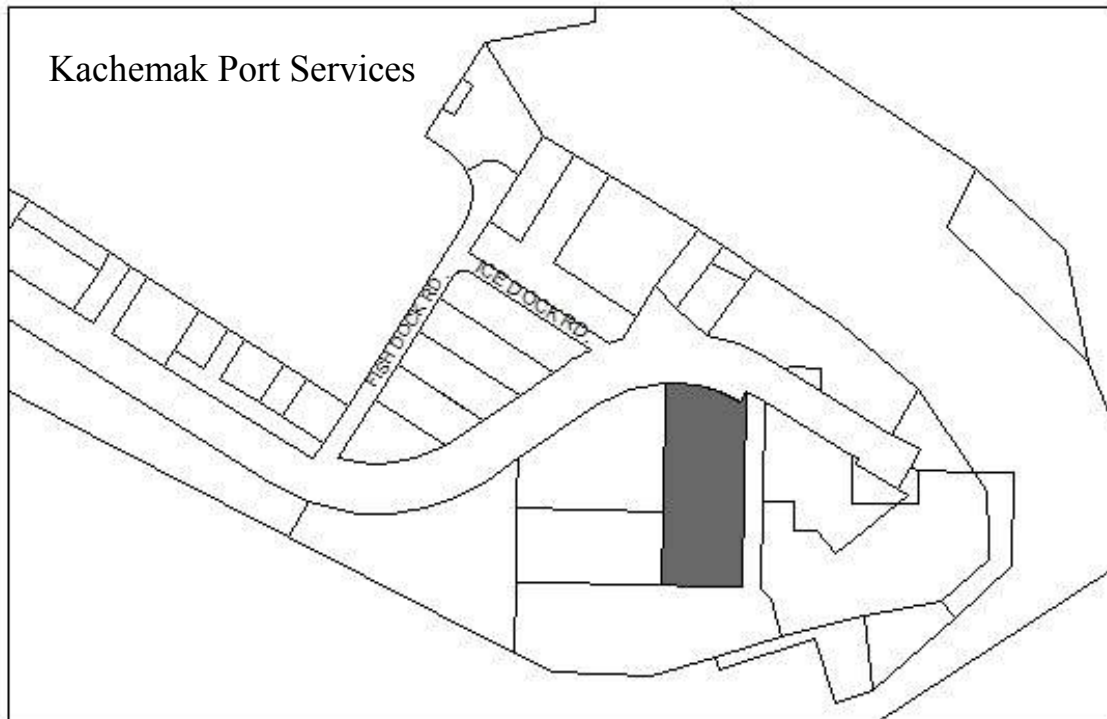
Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 843 Fish Dock Road

Leased to: Harbor Enterprises/Terminal Oil Sales. Coal Point Fuel Dock.
 Expiration: 11/30/2018. No options left.

Finance Dept. Code:



Designated Use: Leased Land. Also includes the Port Maintenance Shop and a large tank.
Acquisition History:

Area: 2.23 acres
 (Lease is for a small portion of the lot)

Parcel Number: 18103404

2012 Assessed Value: 1,540,500 (\$Land: \$496,500 Structure: \$1,044,000)

Legal Description: HM0890034 T07S R13W S01 HOMER SPIT SUB AMENDED LOT 48 EXCLUDING THAT PORTION AS PER LICENSE AGREEMENT 190 @ 98

Zoning: Marine Industrial

Wetlands: N/A

Infrastructure: Water, sewer, paved road access

Address: 4667 Homer Spit Road

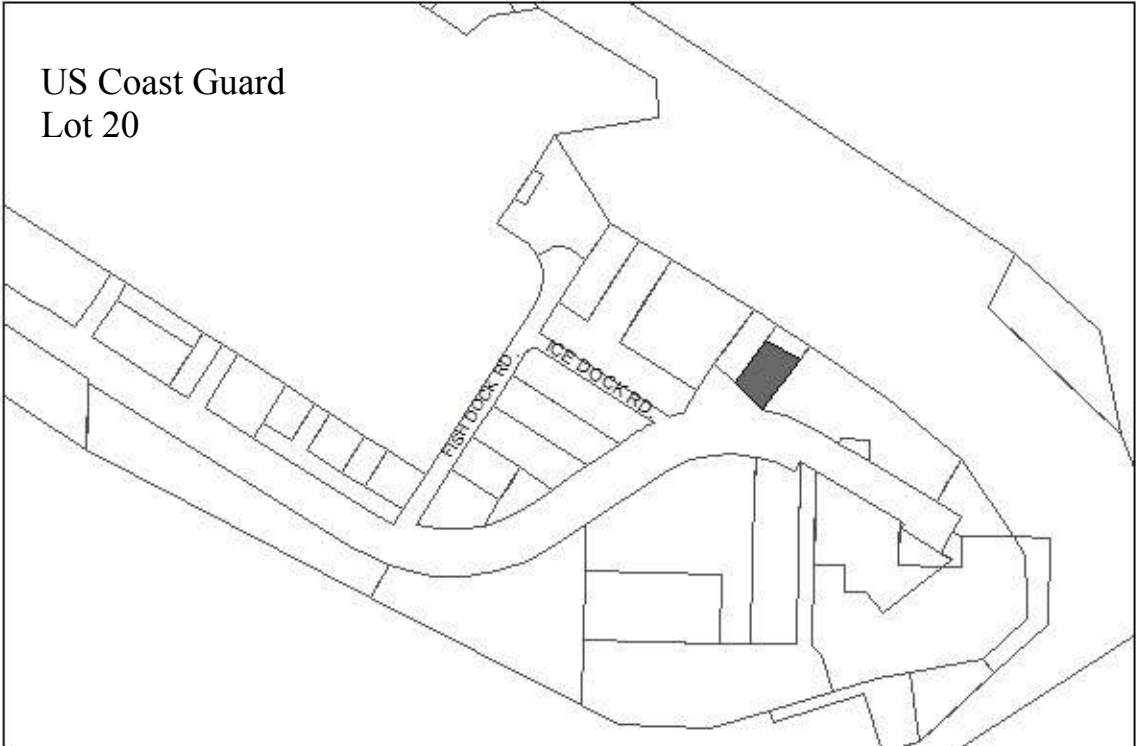
Leased to:

ACS MACTel lease: Expires 11/21/2033 with two additional one year options. (875 sq ft lease)

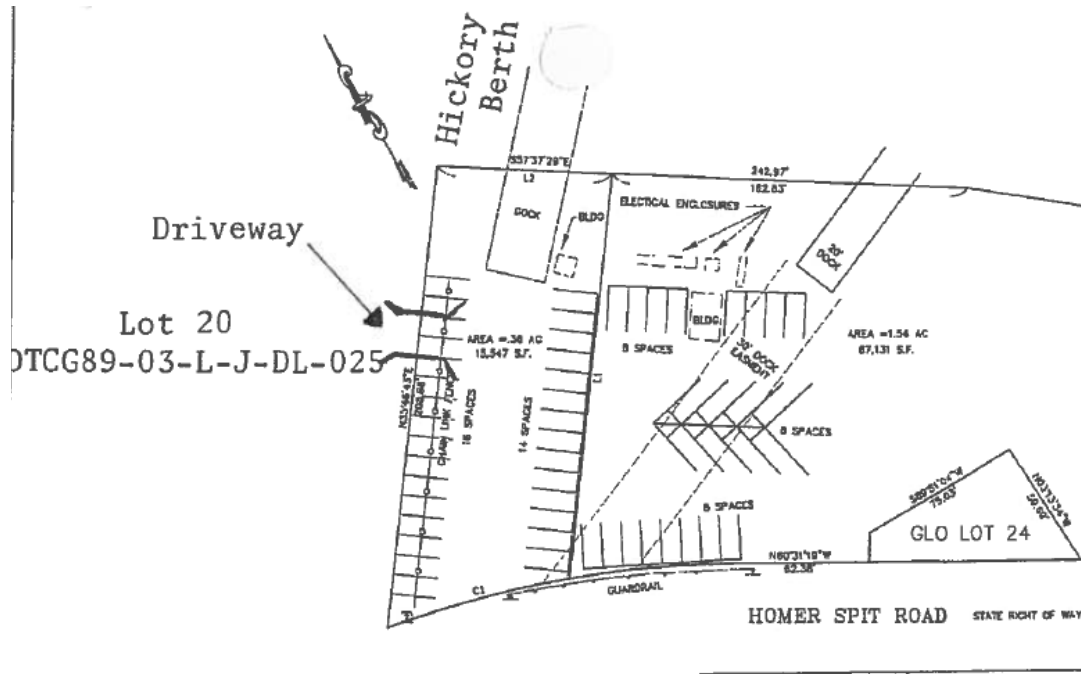
Alaska Marine Highway lease: Alaska Marine Highway System to built a warehouse to support ferry operations, summer 2011. Lease expires 2060. (16,000 sq ft leased)

The Port Maintenance Shop is on this lot, and a large water tank, and other accessory structures.

Finance Dept. Code:

 US Coast Guard Lot 20	
Designated Use: Lease Acquisition History:	
Area: 0.35 acres	Parcel Number: 18103445
2012 Assessed Value: \$112,800	
Legal Description: Portion of Government Lot 20	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	Address: 4688 Homer Spit Road
Leased to: US Coast Guard. Lease expires September 30, 2023 Resolution 15-009 approved an additional 20 year lease.	
Finance Dept. Code:	

Hickory Lease

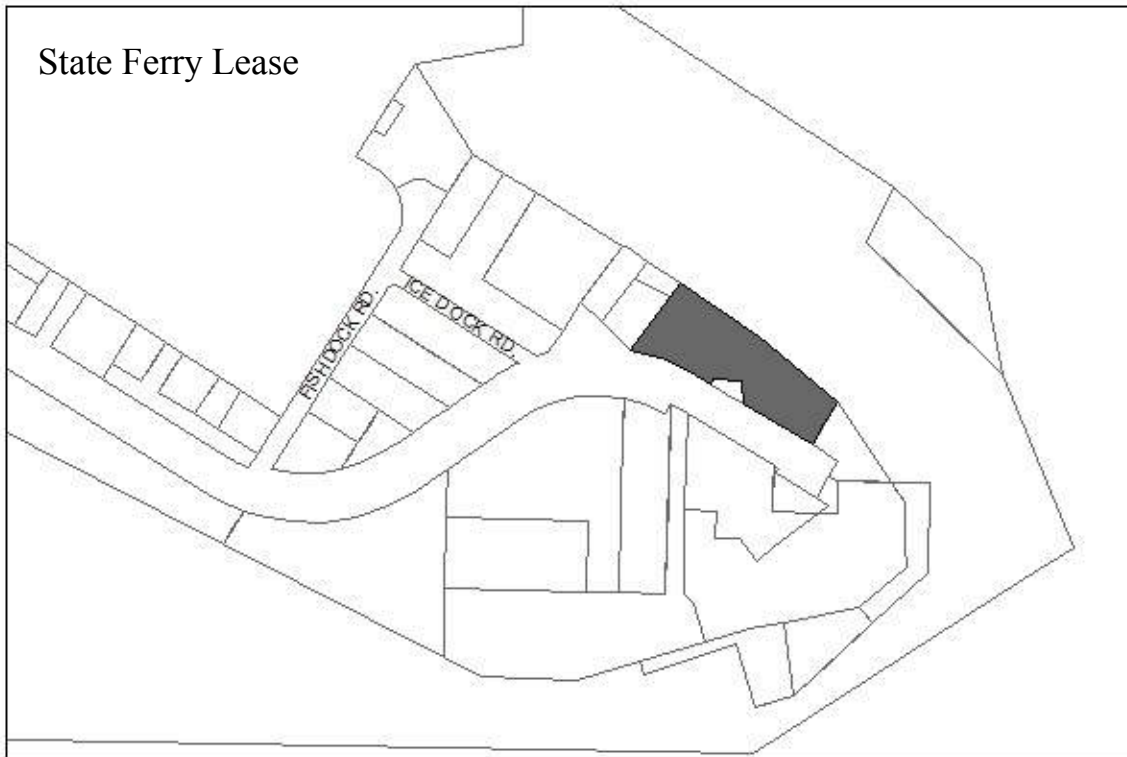


See page B-25. This lease is a portion of the Pioneer Dock.

West trestle of the Pioneer Dock, for mooring and parking on west trestle and Lot 45A.

Leased to: Coast Guard. Expiration September 30, 2022. DTCG89-03-L-J-DL-034.

Finance Dept. Code:



Designated Use: Ferry Terminal and Staging

Acquisition History: Quitclaim Deed to KPPUDIST #1 2/18/64: Orig Cert filed between KPPUD and BLM for Harbor use for 25 years on 7/29/55.

Area: 1.83 acres or 79,799 sq ft

Parcel Number: 18103447

2012 Assessed Value: \$1,076,900 (\$423,800 Land, \$653,100 Structure)

Legal Description: HM0930049 T07S R13W S01 HOMER SPIT SUB NO 6 VELMA'S ADDN LOT 45-A

Zoning: Marine Industrial

Wetlands: None

Infrastructure: Paved road, water and sewer.

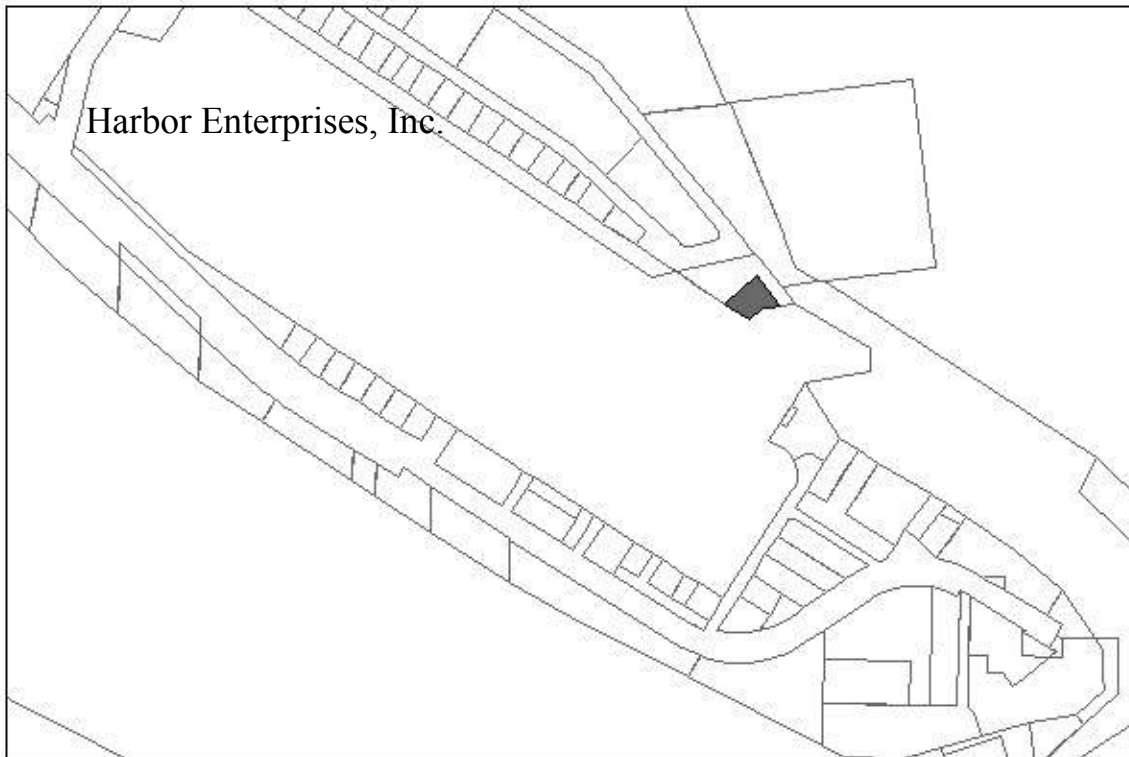
Address: 4690 Homer Spit Road

Leased to: Alaska Marine Highway

Expiration: April 30, 2060

MOA on file regarding ferry terminal and city maintenance shop.

Finance Dept. Code:



Designated Use: Leased Land (Fuel tanks for fuel dock)

Acquisition History:

Area: 20,000 sq ft (0.459 acres)

Parcel Number: 18103260

2012 Assessed Value: \$361,800 (Land: \$140,400 Structure: \$221,400)

Legal Description: HM0970072 T07S R13W S01 HOMER SPIT NO 6 8-E-1

Zoning: Marine Industrial

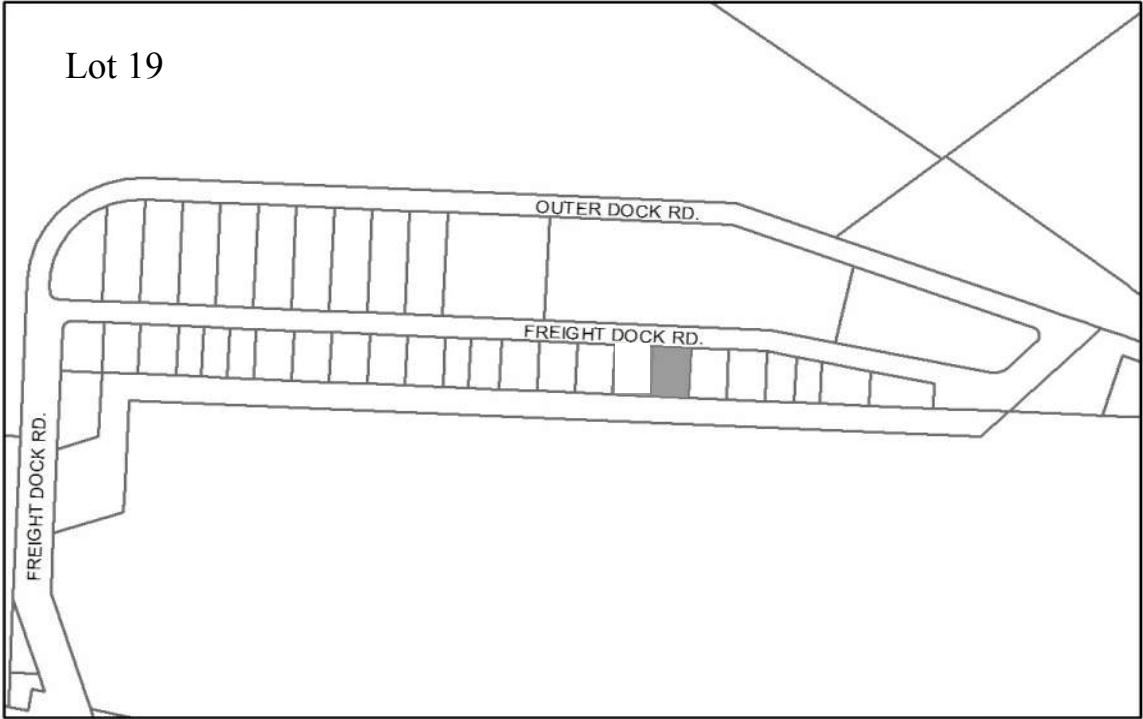
Wetlands: None

Infrastructure: Paved road, water and sewer.

Address: 4607 Freight Dock Road

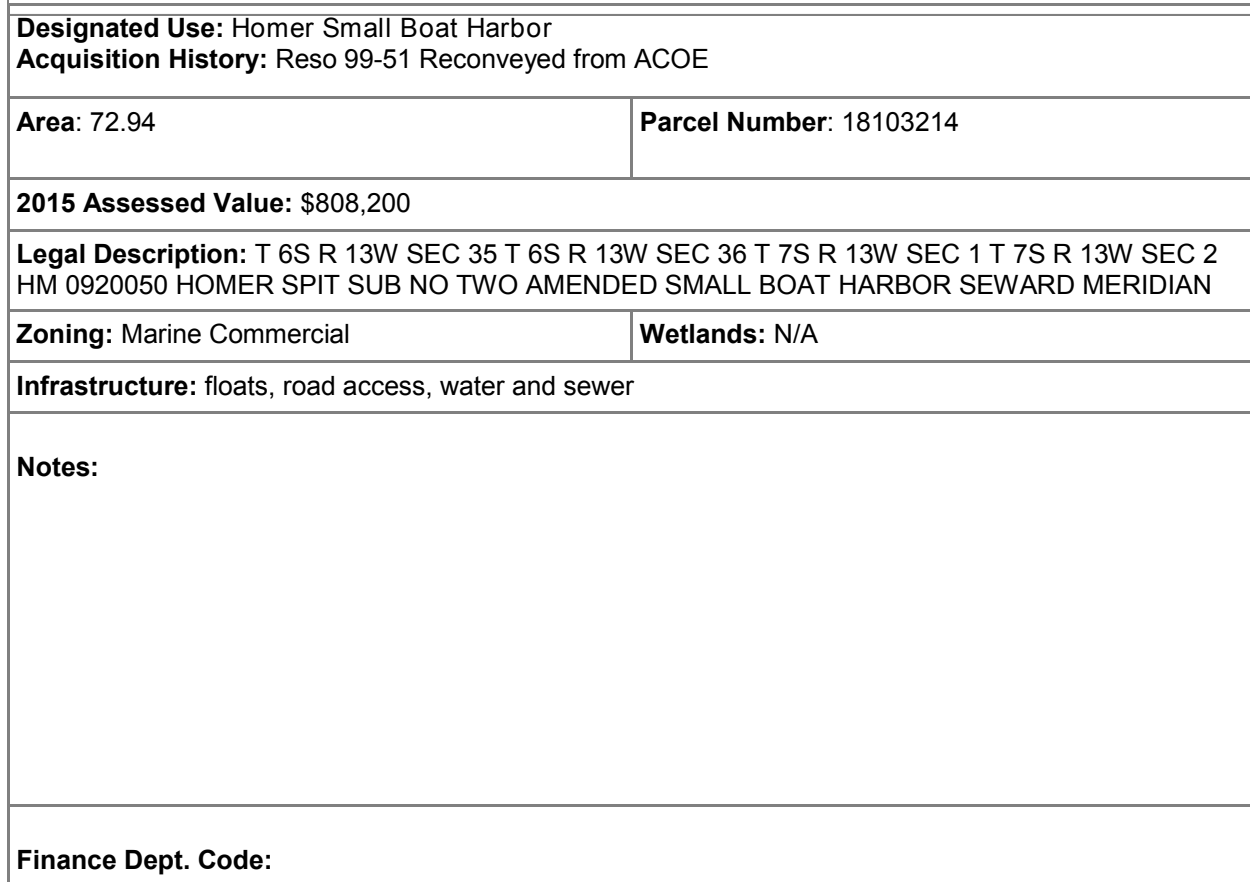
Leased to: Harbor Enterprises/Terminal Oil Sales
Resolution 16-031(S) 20 yr lease

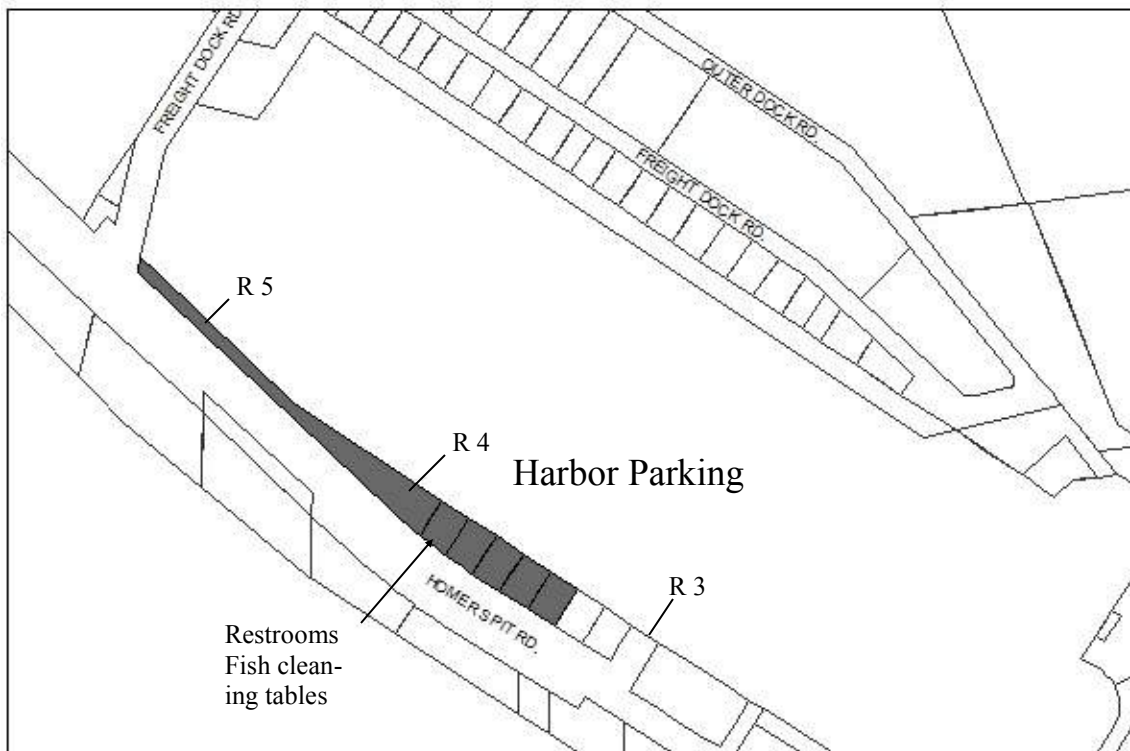
Finance Dept. Code:

 Lot 19	
Designated Use: Lease (Resolution 09-33) Acquisition History:	
Area: 0.96 acres, 0.32 acres	Parcel Number: 181032 38
2012 Assessed Value: \$105,000	
Legal Description: Homer Spit No 5 Lots 19	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: paved road, water and sewer	
Notes: Leased to Fortune Sea LLC, 10 year lease expires 4/30/2023	
Finance Dept. Code:	

Section C

Port Facilities





Designated Use: Parking

Acquisition History:

Area: 3.12 acres

Parcel Number: 181033 18-22, 24

2015 Assessed Value: \$1,055,000 (Land: \$885,600, Structures: \$169,400)

Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0890034 HOMER SPIT SUB AMENDED LOT 13-17, HM 0910003 HOMER SPIT SUB NO TWO SEWARD MERIDIAN LOT 12A

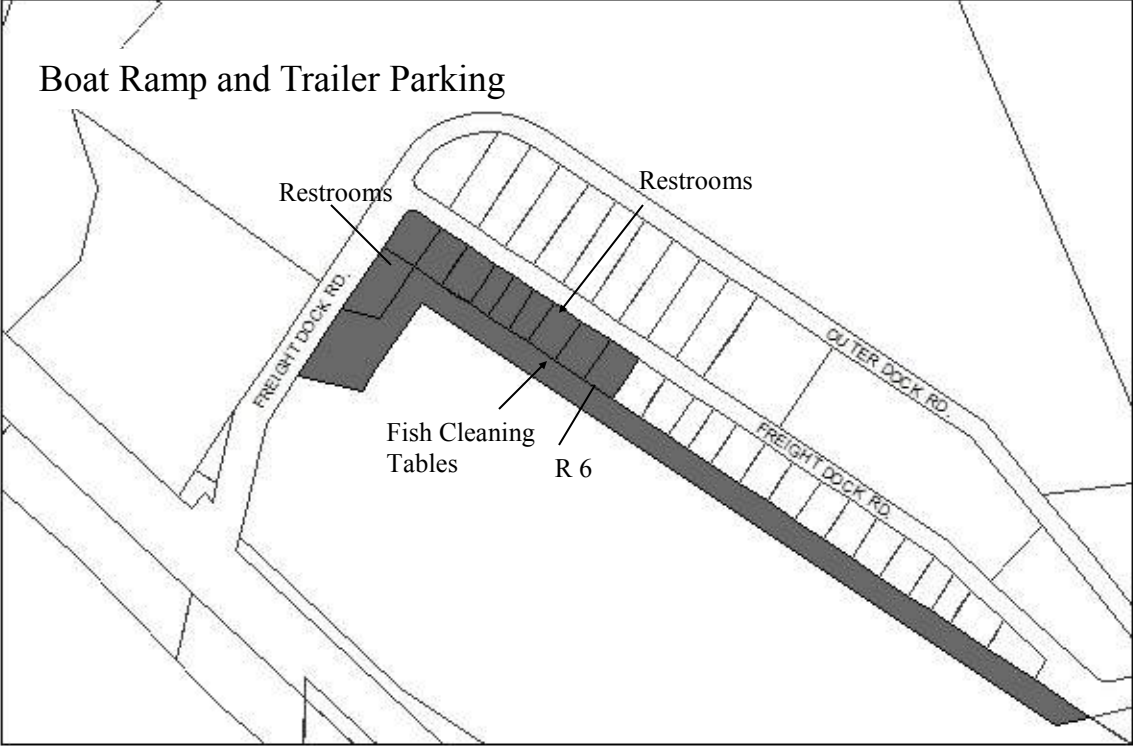
Zoning: Marine Commercial

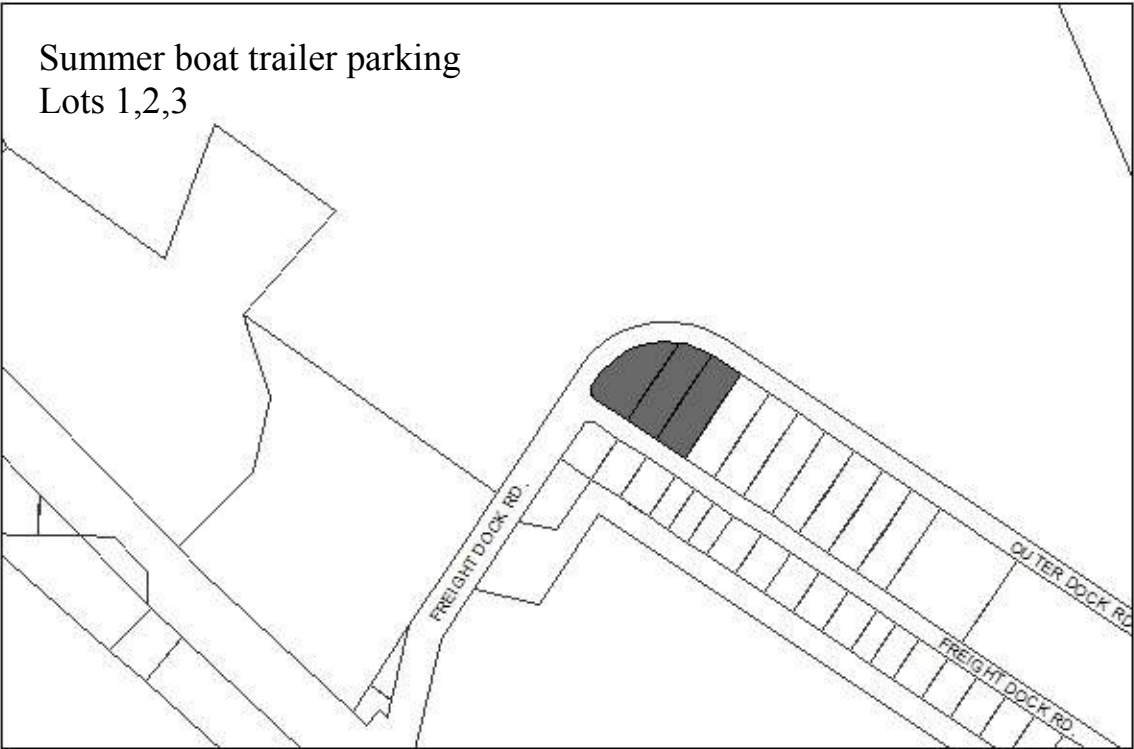
Wetlands: N/A

Infrastructure: Paved road, gas, Spit Trail, water and sewer, public restrooms

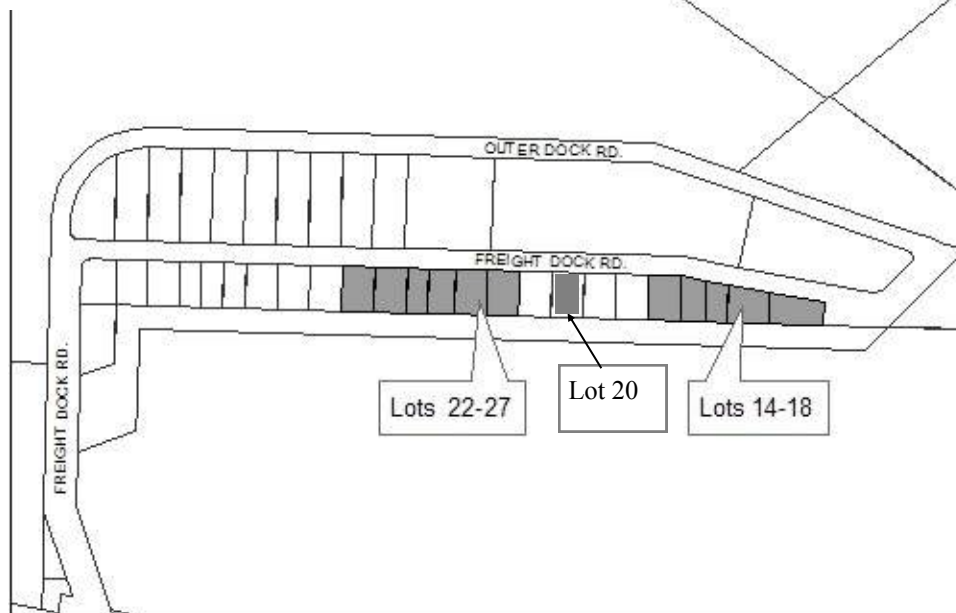
Notes: New restrooms at Ramp 5 constructed 2015/2016

Finance Dept. Code:

	
Designated Use: Boat ramp and trailer parking Acquisition History:	
Area: 8.32 acres	Parcel Number: 181032 47-58, 18103216
2015 Assessed Value: \$1,999,000	
Legal Description: Homer Spit Sub No 5 Lots 28-37, Homer Spit Sub No 2 Amended Lot G-8	
Zoning: Marine Industrial, over slope area is Marine Commercial	Wetlands: N/A
Infrastructure: paved road, gas, water and sewer, public restrooms	
Notes: Includes boat launch (reconstructed in 2016), Spit Trail, boat trailer parking, two public restrooms and over slope area along the harbor. Resolution 2007-51: Lots 14-35, RFP process should be delayed until the master parking plan and over slope development standards and issues are dealt with.	
Finance Dept. Code:	

 Summer boat trailer parking Lots 1,2,3	
Designated Use:	
Acquisition History:	
Area: 1.98 acres	Parcel Number: 181032-21,22,31
2015 Assessed Value: \$562,300	
Legal Description: T 6S R 13W SEC 35 T 6S R 13W SEC 36 HM 0930012 HOMER SPIT SUB NO 5 SEWARD MERIDIAN LOT 1,2,3	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: paved road, gas, water and sewer, Barge ramp	
Notes:	
Finance Dept. Code:	

Port Use Lots 14-27

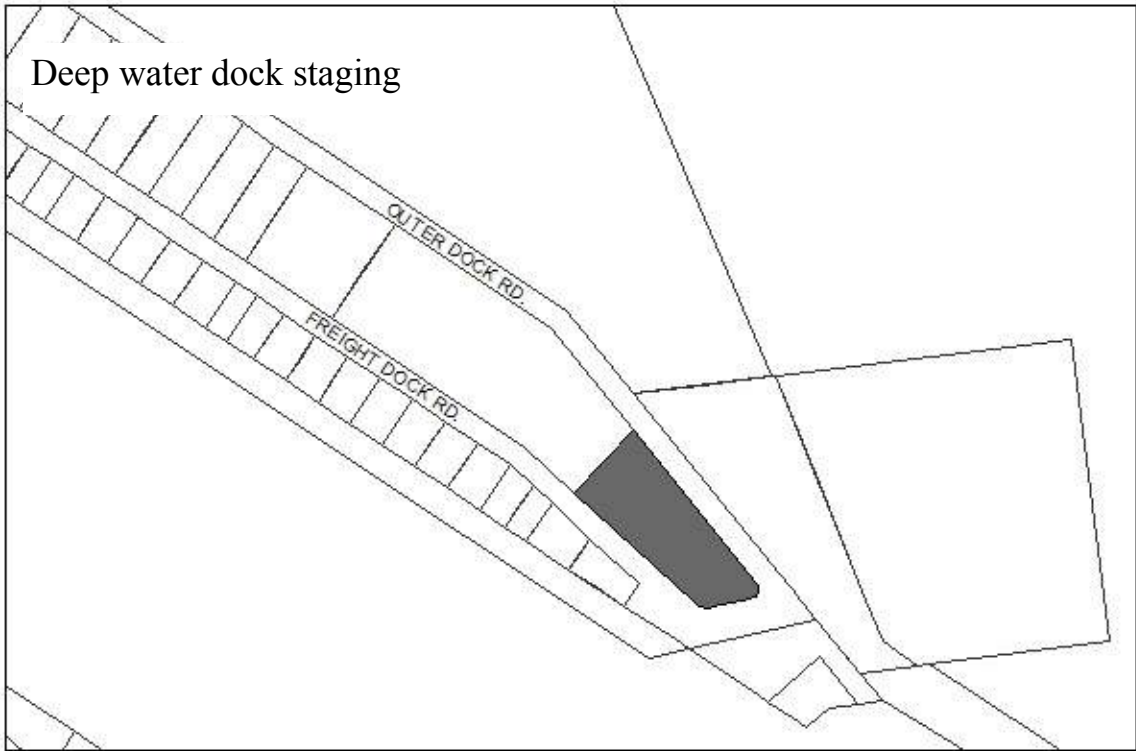
**Designated Use:** Port Use**Acquisition History:****Area:** 3.16 acres**Parcel Number:** 18103233-37, 41-46**2015 Assessed Value:** \$1,816,300**Legal Description:** Homer Spit No 5 Lots 14-18, 22-27**Zoning:** Marine Industrial**Wetlands:** N/A**Infrastructure:** paved road, gas, Spit Trail, water and sewer**Notes:**

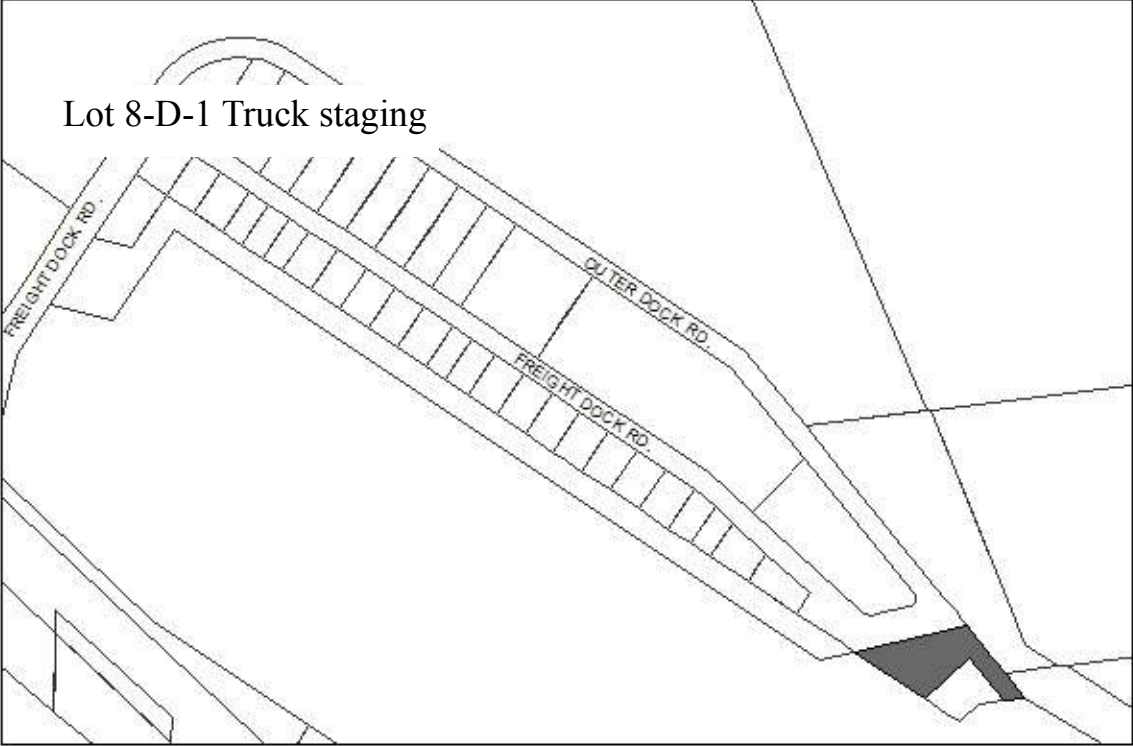
Resolution 2007-51: Lots 14-35, RFP process should be delayed until the master parking plan and over slope development standards and issues are dealt with.

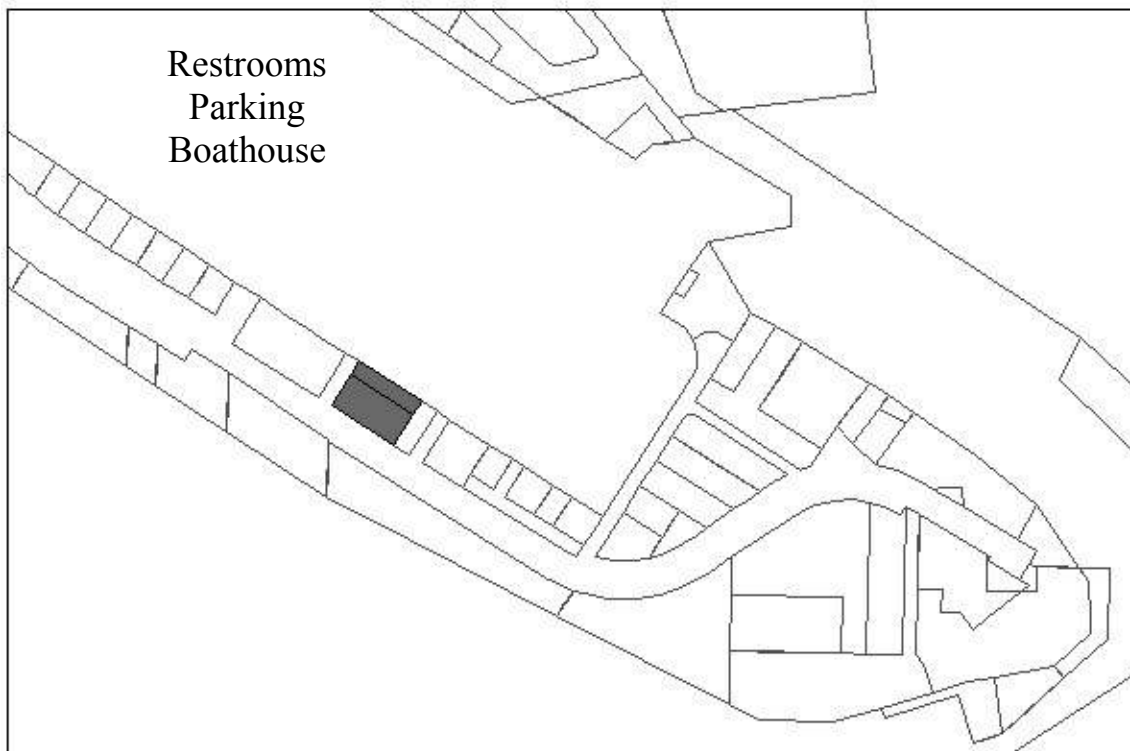
The office completed in 2015 is on lots 22 and 23.

Lot 20 reserved for future travel lift Resolution 13-032

Finance Dept. Code:

	
Designated Use: Deep water dock staging Acquisition History:	
Area: 2.08 acres	Parcel Number: 18103232
2015 Assessed Value: \$469,600	
Legal Description: T 6S R 13W SEC 36 T 7S R 13W SEC 1 HM 0930012 HOMER SPIT SUB NO 5 SEWARD MERIDIAN LOT 13	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: paved road, gas, water and sewer	
Notes: Resolution 2007-51 Lot 13: Continue its current use as gear storage and cargo staging for Deep Water Dock cargo.	
Finance Dept. Code:	

	
Designated Use: Commercial Truck Staging Acquisition History:	
Area: 1.12 acres	Parcel Number: 18103259
2015 Assessed Value: \$301,800	
Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0970072 HOMER SPIT NO 6 8-D-1	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: Gravel road access, water and sewer	
Notes: Resolution 2007-51: Lot 8D1 should be reserved for a marine related business which could include a petroleum products tank farm and a pipeline out to the (expanded) Deep Water Dock. This lot to be RFP's at the appropriate time for this type of marine support activity. 2014 construction of guard shack for Deep Water Dock, restrooms and picnic facility, completion of Spit Trail, and paved the lot for dock staging.	
Finance Dept. Code:	



Designated Use: Parking, restrooms and boathouse (Reso 16-043)

Acquisition History:

Area: 0.93 acres

Parcel Number: 18103397

2009 Assessed Value: \$446,700 (Land: \$358,900 Structures: \$107,800)

Legal Description: Homer Spit Subdivision Amended Homer Boathouse Replat Lot 28-A

Zoning: Marine Commercial

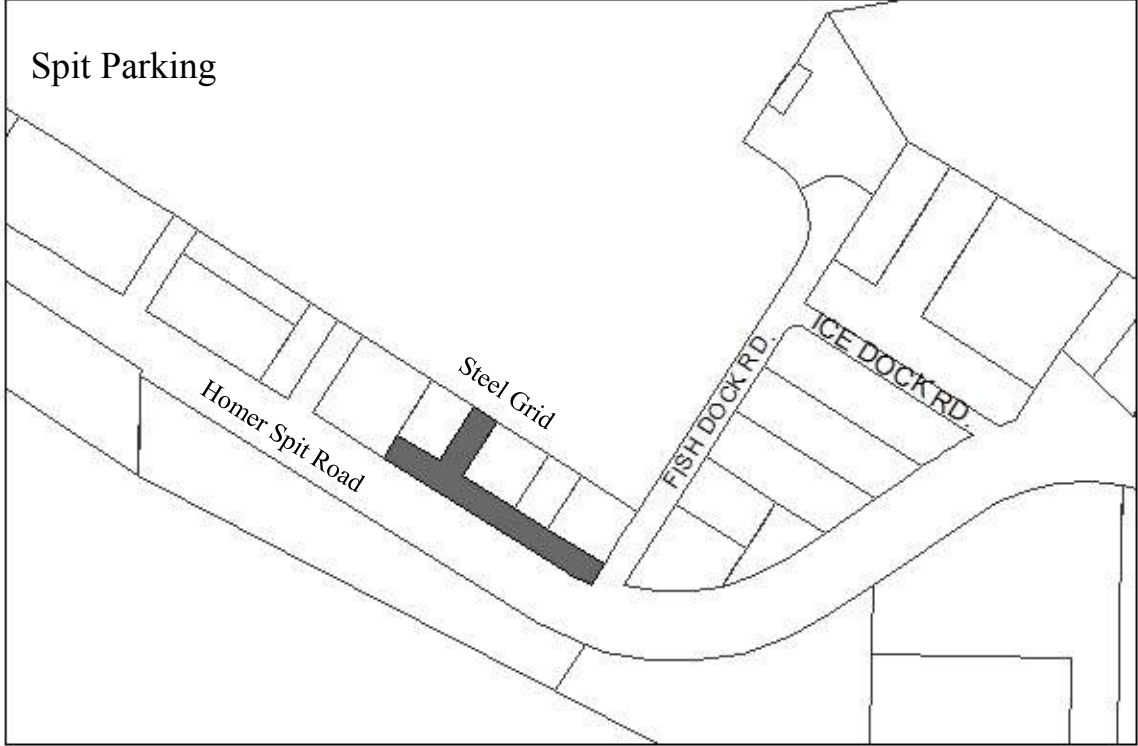
Infrastructure: Paved road, gas, water and sewer

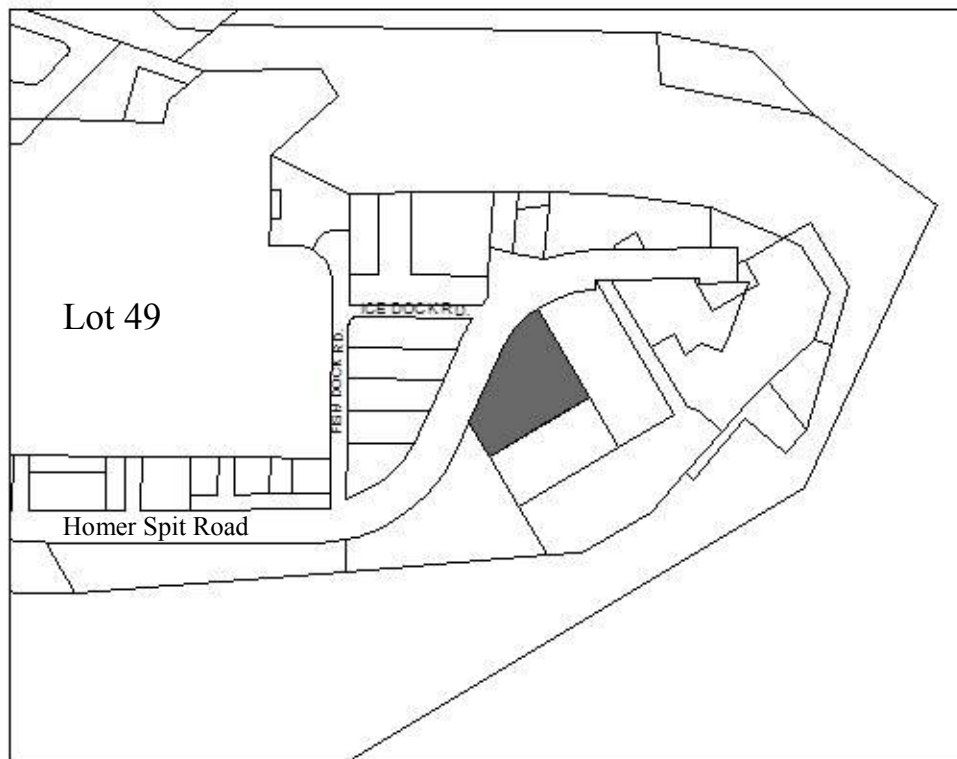
Restrooms built in 1974. Property was part of a Land and Water Conservation Fund Grant in 1972, Project #02-00072. Land may be required to remain parkland in perpetuity.

Former site of Harbormaster Office.

Boat house construction scheduled for 2017/18 on a portion of the property.

Finance Dept. Code:

 The map shows a coastal area with several roads and a parking area. Homer Spit Road runs diagonally from the bottom left towards the center. A dark shaded area labeled 'Steel Grid' is located between Homer Spit Road and Fish Dock Rd. Fish Dock Rd runs diagonally from the center towards the top right. Ice Dock Rd runs diagonally from the top right towards the center. The area between Homer Spit Road and Fish Dock Rd is labeled 'Spit Parking'.	
Designated Use: Parking and Access	
Acquisition History:	
Area: 0.6 acres	Parcel Number: 18103441
2015 Assessed Value: \$173,700	
Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0920050 HOMER SPIT SUB NO TWO AMENDED PARKING AND ACCESS AREA	
Zoning: Marine Commercial	Wetlands: N/A
Infrastructure: Paved road	
Notes: Provides parking for adjacent businesses, and harbor access.	
Finance Dept. Code:	



Designated Use: Main Dock Staging
Acquisition History:

Area: 2 acres

Parcel Number: 18103403

2015 Assessed Value: \$712,000

Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0890034 HOMER SPIT SUB AMENDED LOT 49

Zoning: Marine Industrial

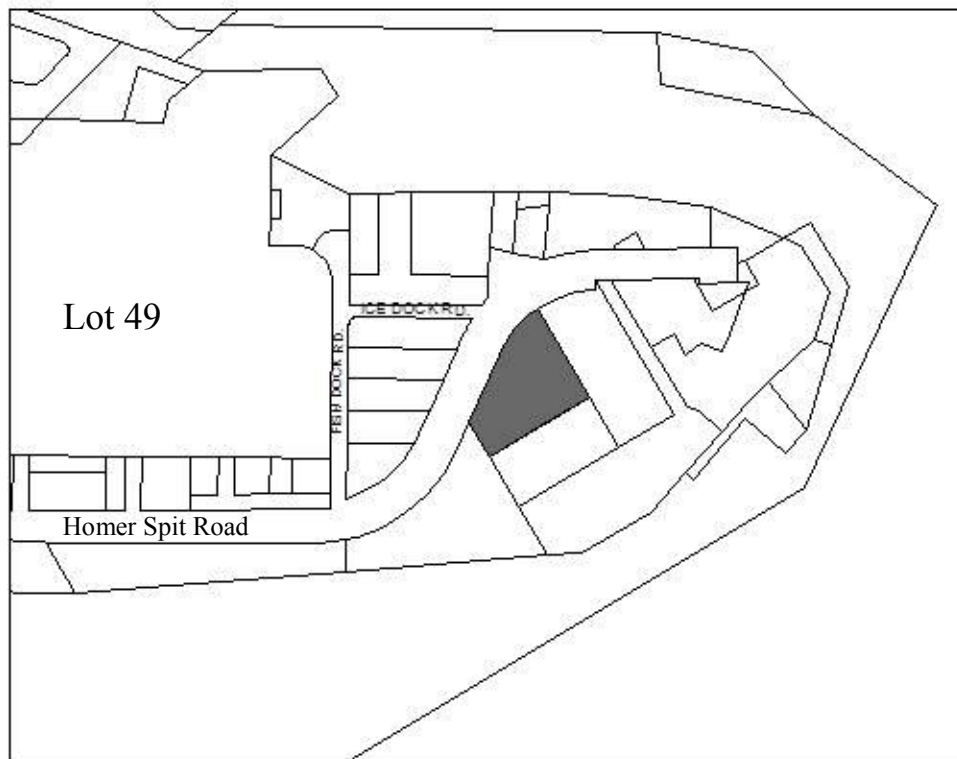
Wetlands: N/A

Infrastructure: Paved road, gas, water and sewer

Notes:

Resolution 2007-51: Continue to use for dredge material dewatering.

Finance Dept. Code:



Designated Use: Main Dock Staging
Acquisition History:

Area: 2 acres

Parcel Number: 18103403

2015 Assessed Value: \$712,000

Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0890034 HOMER SPIT SUB AMENDED LOT 49

Zoning: Marine Industrial

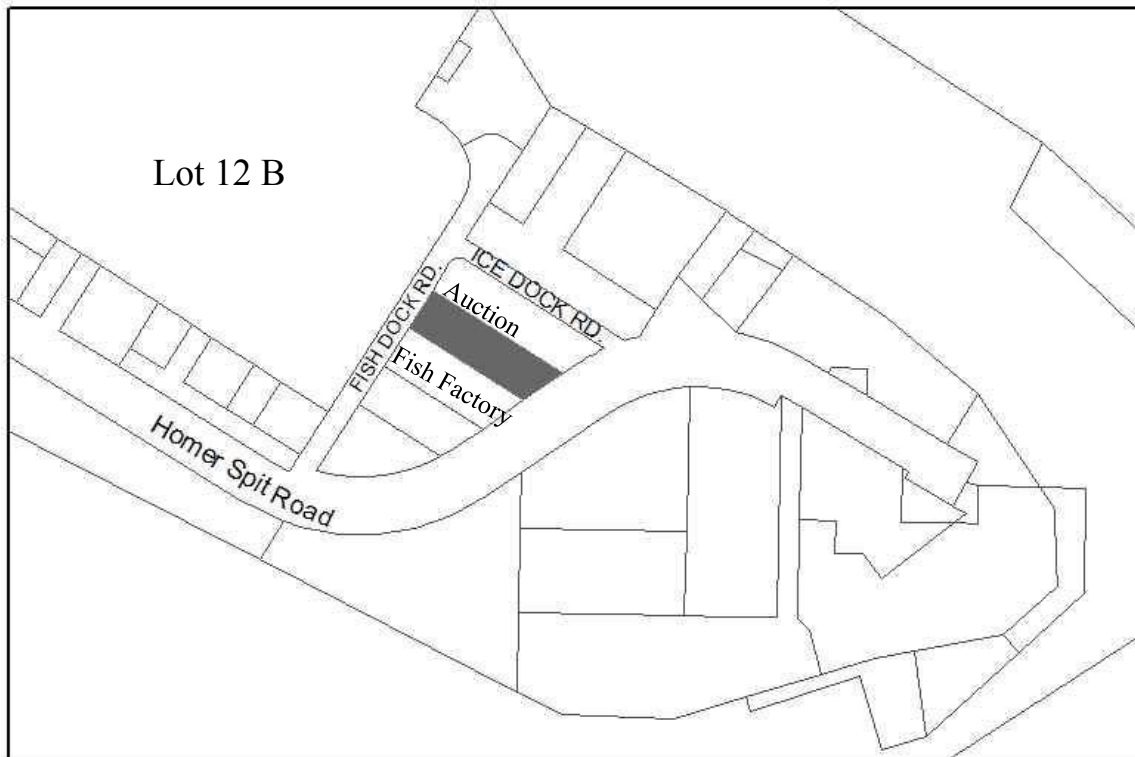
Wetlands: N/A

Infrastructure: Paved road, gas, water and sewer

Notes:

Resolution 2007-51: Continue to use for dredge material dewatering.

Finance Dept. Code:



Designated Use: Leased Lands
Acquisition History:

Area: 0.68 acres

Parcel Number: 18103451

2009 Assessed Value: \$265,300

Legal Description: City of Homer Port Industrial Subdivision No 4 Lot 12-B

Zoning: Marine Industrial

Infrastructure: Water, sewer, paved road access

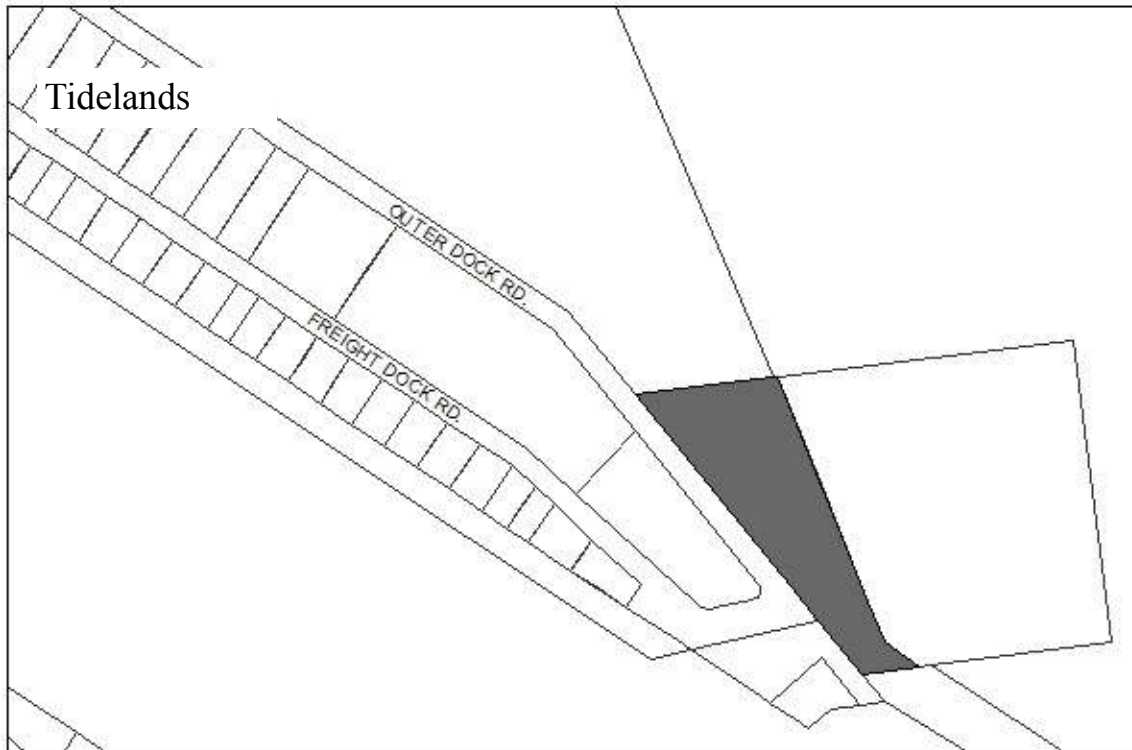
Address:

Parcel has the fish grinder on it, and possibly a short term lease for storage from neighboring business. The whole parcel is not readily available for a long term lease.

Resolution 09-33: Remove Lot 12-B City of Homer Port Industrial Subdivision No 4 from lots that may be leased until the drainage issues are resolved.

Resolution 10-21: Administration is directed to address the drainage problems and usage of this lot.

Finance Dept. Code:



Designated Use: Tidelands
Acquisition History:

Area: 4.19 acres

Parcel Number: 18103213

2017 Assessed Value: \$6,000

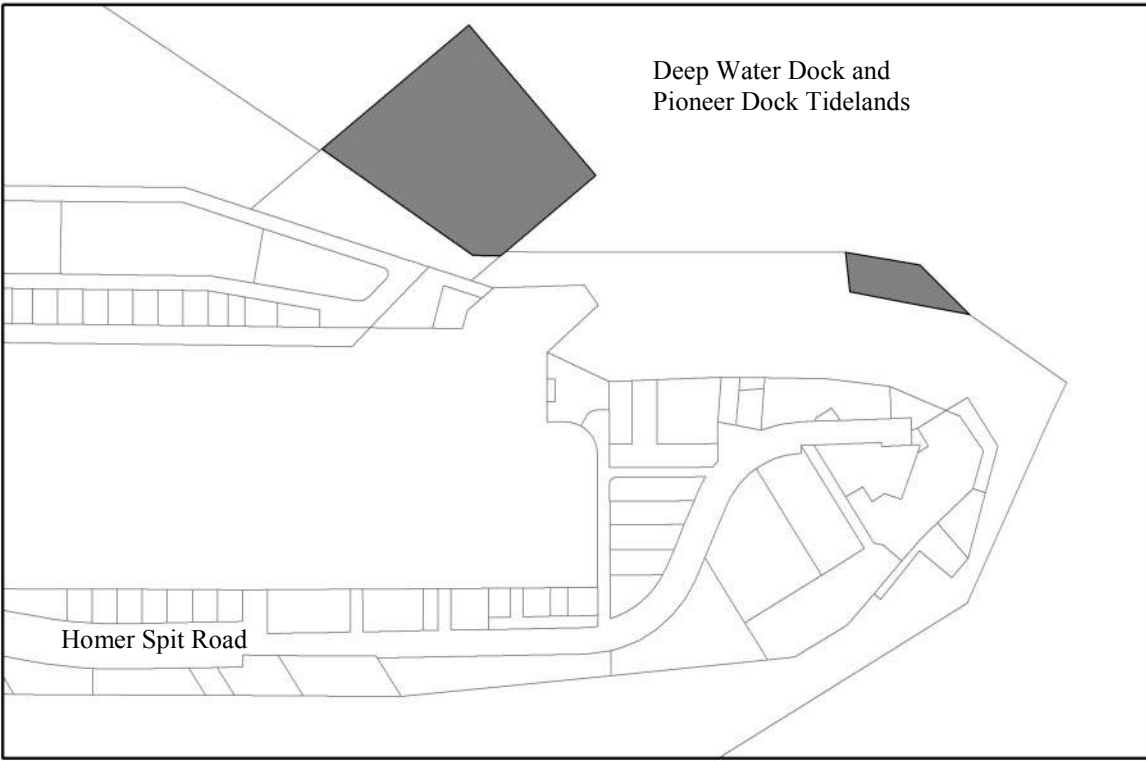
Legal Description: T 6S R 13W SEC 36 T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0920050
 HOMER SPIT SUB NO TWO AMENDED TRACT A

Zoning: Not zoned

Wetlands: Tidelands

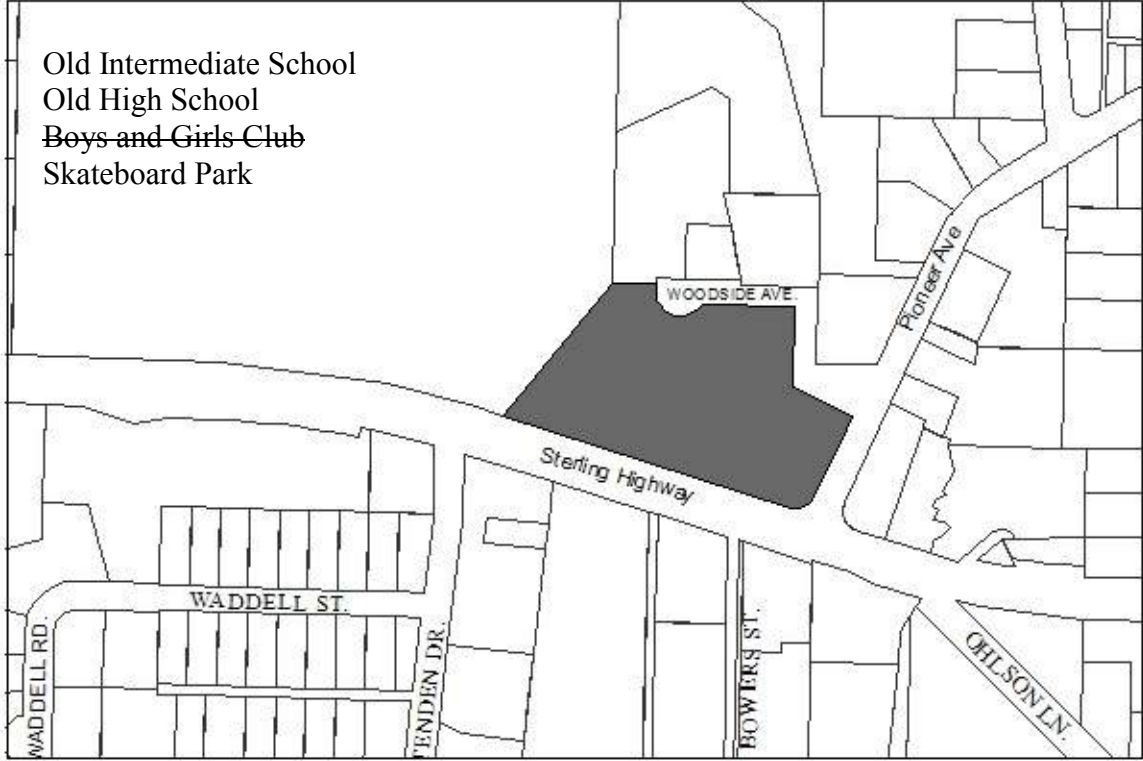
Infrastructure:

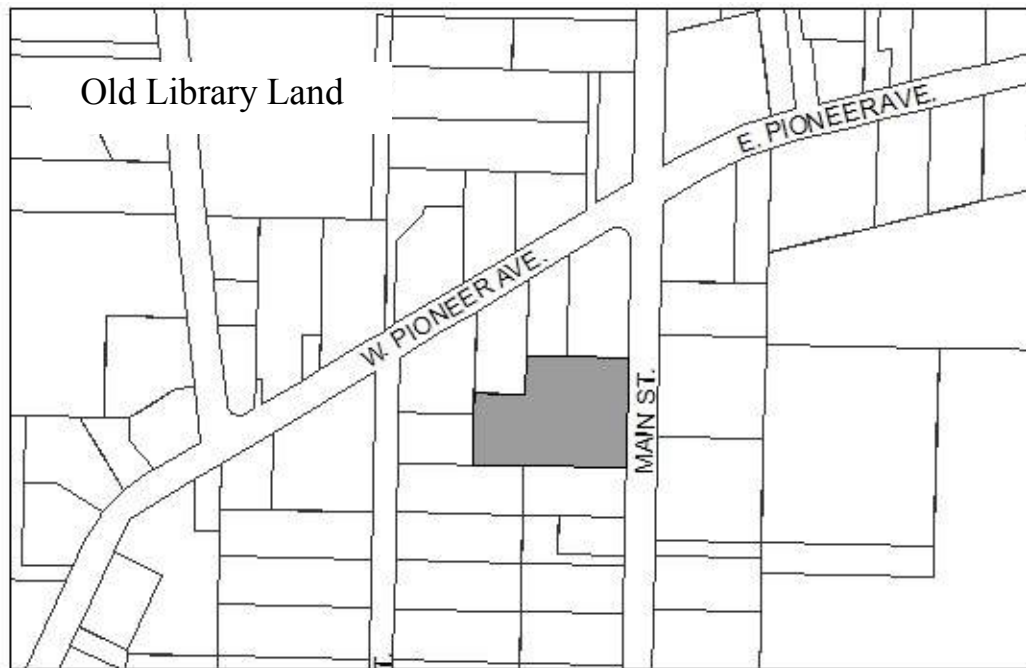
Finance Dept. Code:

	
Designated Use: Port and Harbor Use Acquisition History: Resolution 17-81	
Area: 11.91 acres, 1.37 acres	Parcel Number: 18103203, 18107005
2017 Assessed Value: \$6,113,100	
Legal Description: ATS 1373 and ATS 1603	
Zoning: Outside city limits	Wetlands: N/A
Infrastructure:	
Notes: Acquired from the State of Alaska	
Finance Dept. Code:	

Section D

City Facilities and Other Lands

	
Designated Use: Resolution 14-110, Designating the Homer Education and Recreation Complex (HERC) Site as the Location for the Proposed New Homer Public Safety Building Acquisition History: Given to the City by KPB. Old Middle School and HS. Reso 98-63	
Area: 4.3 acres	Parcel Number: 17510070
2015 Assessed Value: \$4,809,400 (Land \$809,400 Structure, built in 1956 25,000 sq ft \$4,000,000)	
Legal Description: HM2000022 T06S R13W S19 TRACT 2 HOMER SCHOOL SURVEY 1999 CITY ADDN	
Zoning: Central Business District	Wetlands: Creek on western edge
Infrastructure: Paved access and parking. Water and Sewer.	
Notes: • Skateboard Park on premises. • Deed restrictions removed by Kenai Peninsula Borough, fall 2014	
Finance Dept. Code: 170.0032 175.100.05	



Designated Use: Sell.

Acquisition History: Deed: Jewel July 1982 (back lot portion) Deed: Watson 1978 (library/Pioneer area)

Area: 1.31 acres

Parcel Number: 17514416

2016 Assessed Value: \$277,700

Legal Description: T 6S R 13W SEC 19 SEWARD MERIDIAN HM 2008016 HOMER PUBLIC LIBRARY NO 2 LOT 2

Zoning: Central Business District

Wetlands: Drainage and wetlands may be present

Infrastructure: Paved road, water, sewer, natural gas

Notes: This land was formerly part of the old library site. The library building was subdivided onto its own lot, and sold. Intent is to sell the lot and pay down debt on the library loan. The City has been attempting to sell the land since 2007.

The land has a nice bay view, but would require stumping. Driveway access off of Main Street is very steep. It is likely significant dirt work would be needed to make this lot viable for commercial or multifamily development.

Finance Dept. Code:

Designated Use: Library. Resolution 2003-72 Acquisition History: KPB Ord 93-09	
Area: 5.25 acres	Parcel Number: 17710739, 17710740
2015 Assessed Value: \$7,973,300 (Land 829,800, Structure 7,503,600)	
Legal Description: HM2005036 T06S R13W S20 TRACT B GLACIER VIEW SUB NO 26, HM2005036 T06S R13W S20 TRACT A GLACIER VIEW SUB NO 26	
Zoning: Central Business District	Wetlands: Some wetlands present
Infrastructure: Paved road access, trail access, gas, water and sewer available.	
Notes:	
Finance Dept. Code:	



Designated Use: City Hall

Acquisition History: Purchased, Schoulz 12/31/86

Area: 1.12 acres

Parcel Number: 17720408

2015 Assessed Value: \$2,067,700 (Land 241,200 Structure 2,206,700)

Legal Description: HM2004048 T06S R13W S20 Glacier View Subdivision Campus Addition Lot 6-A-2

Zoning: Central Business District

Wetlands: None

Infrastructure: Paved road access, gas, water and sewer.

Notes: New addition and remodel 2011/12. Lower parking area paved.

Finance Dept. Code:



Designated Use: Police and fire stations

Acquisition History: Straub Warr Deed 4/74, partial purchase Straub 4/5/74

Area: 1.57 acres

Parcel Number: 17702057

2009 Assessed Value: \$2,391,400 (Land: \$326,900 Structure: \$2,064,500)

Legal Description: HM 0870011 NEW HOMER HIGH SCHOOL NO 2 Tract 1-B

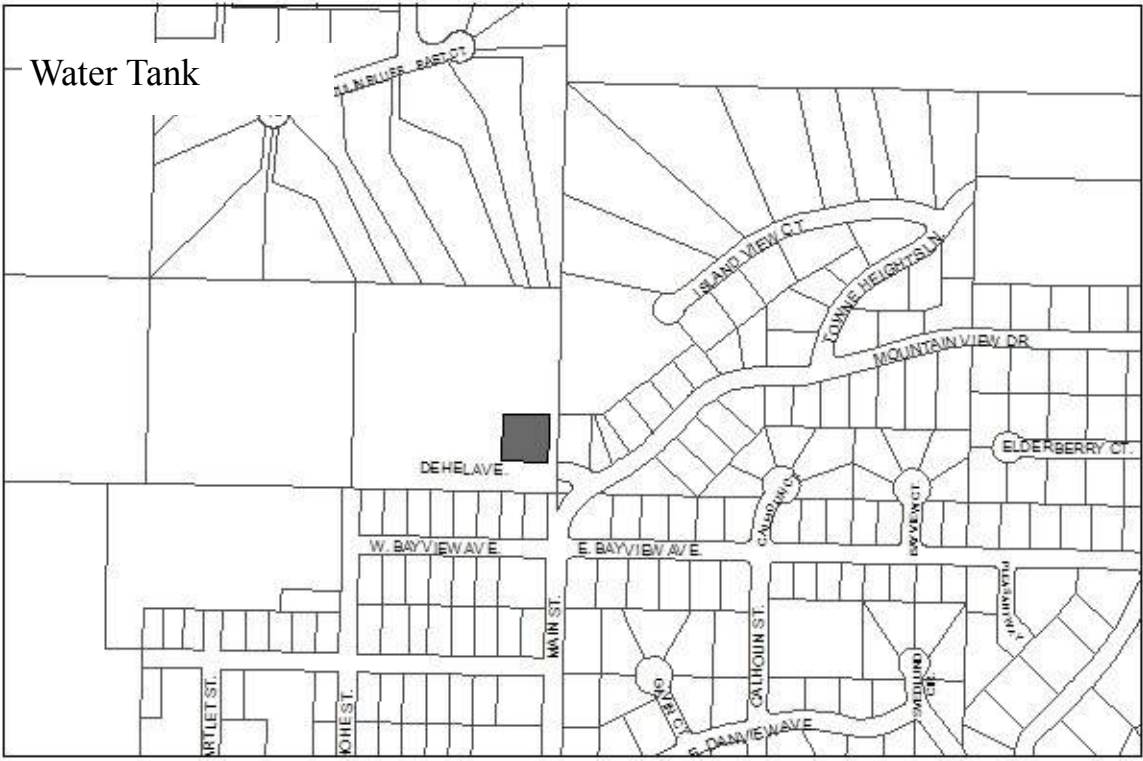
Zoning: Central Business District

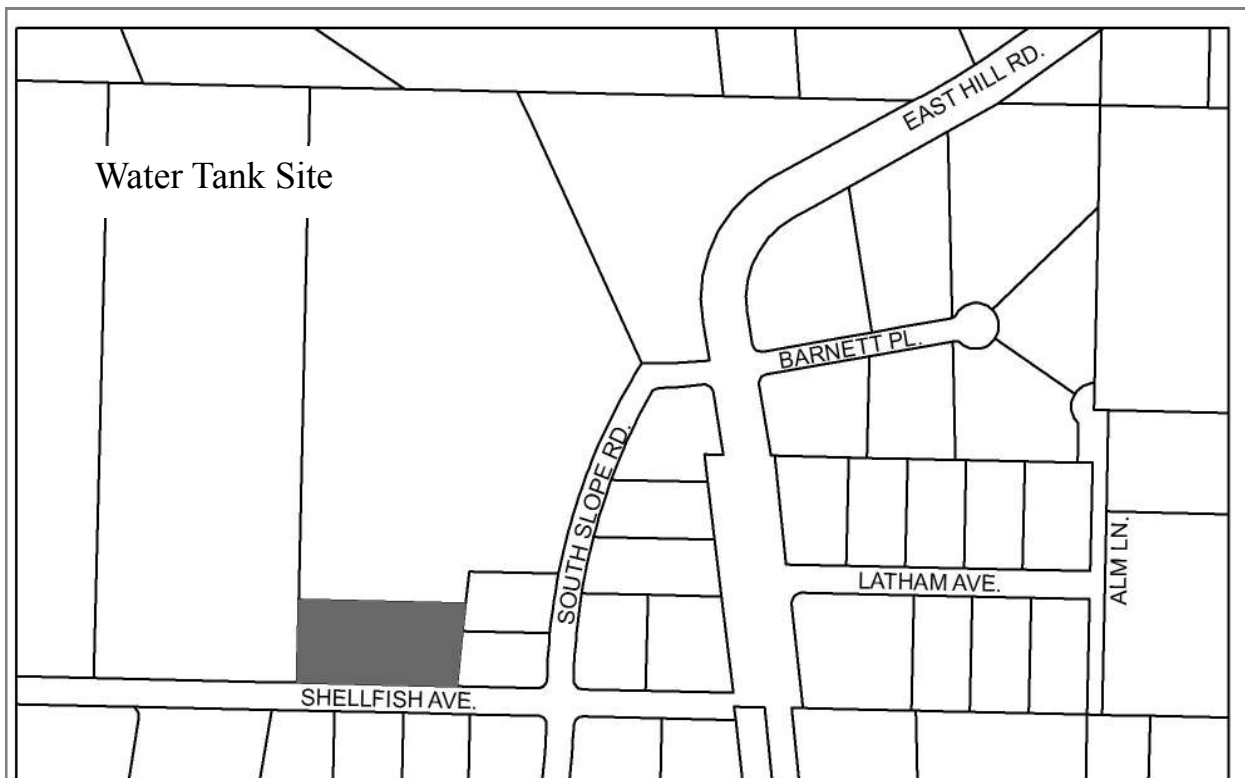
Wetlands: N/A

Infrastructure: Water, Sewer, Paved access

Notes:

Finance Dept. Code:

	
Designated Use: Water Tank (A Frame Tank) Acquisition History: Dehel Deed 6/1/65	
Area: 0.5 acres	Parcel Number: 17504011
2015 Assessed Value: \$345,800 (Land: \$34,100, Structure (water tank))	
Legal Description: HM T06S R13W S18 N 150 FT OF THE S 250 FT OF THE E 180 FT OF THE NE1/4 SE1/4	
Zoning: Rural Residential	Wetlands: Possible drainage through site
Infrastructure: N/A	
Notes:	
Finance Dept. Code:	



Designated Use: Future Water Tank
Acquisition History: Ordinance 14-39

Area: 1.5 acres

Parcel Number: 17701009

2015 Assessed Value: \$98,000

Legal Description: T6S R13W SEC 17 SEWARD MERIDIAN HM 2014023 BARNETT SUB
 QUIET CREEK ADDN 2014 TRACT A2

Zoning: Rural Residential

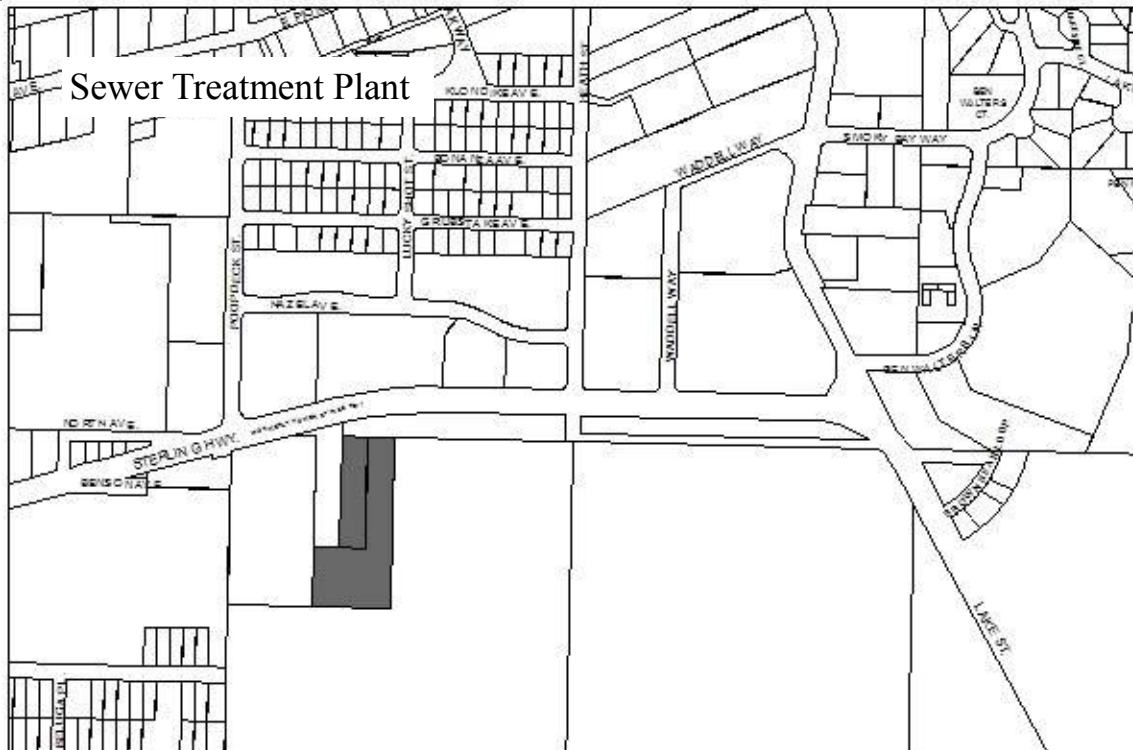
Wetlands:

Infrastructure: N/A

Notes: Future location of a new water tank. Project is shovel ready if federal funding becomes available.

Finance Dept. Code:

	
Designated Use: Animal Shelter Acquisition History: Heath Deed 3/10/71	
Area: 1.85 acres	Parcel Number: 17714020
2015 Assessed Value: \$1,515,300 (Land \$378,900, Structure \$1,136,400)	
Legal Description: Glacier View Subdivision No 18 Lot 1	
Zoning: Central Business District	Wetlands: N/A
Infrastructure: Water, Sewer, gas, gravel access via Public Works	
Notes: Also includes landscaped area along the Sterling Highway maintained by Parks and Recreation, and named Superintendent's Park. Constructed in 2004. 3,828 sq feet.	
Finance Dept. Code:	



Acquisition History: see below

Parcel Number: 177140 14, 15

Legal Description: T 6S R 13W SEC 20 SEWARD MERIDIAN HM POR PER E1/2 NW1/4 NE1/4 SW1/4 PER D-60-164, T 6S R 13W SEC 20 SEWARD MERIDIAN HM THAT PORTION OF E1/2 NW1/4 NE1/4 SW1/4 PER D-60 @ 05

Wetlands: Yes

Notes:

Acquisition:

17414014: Mitchell Warr Deed 1/9/84

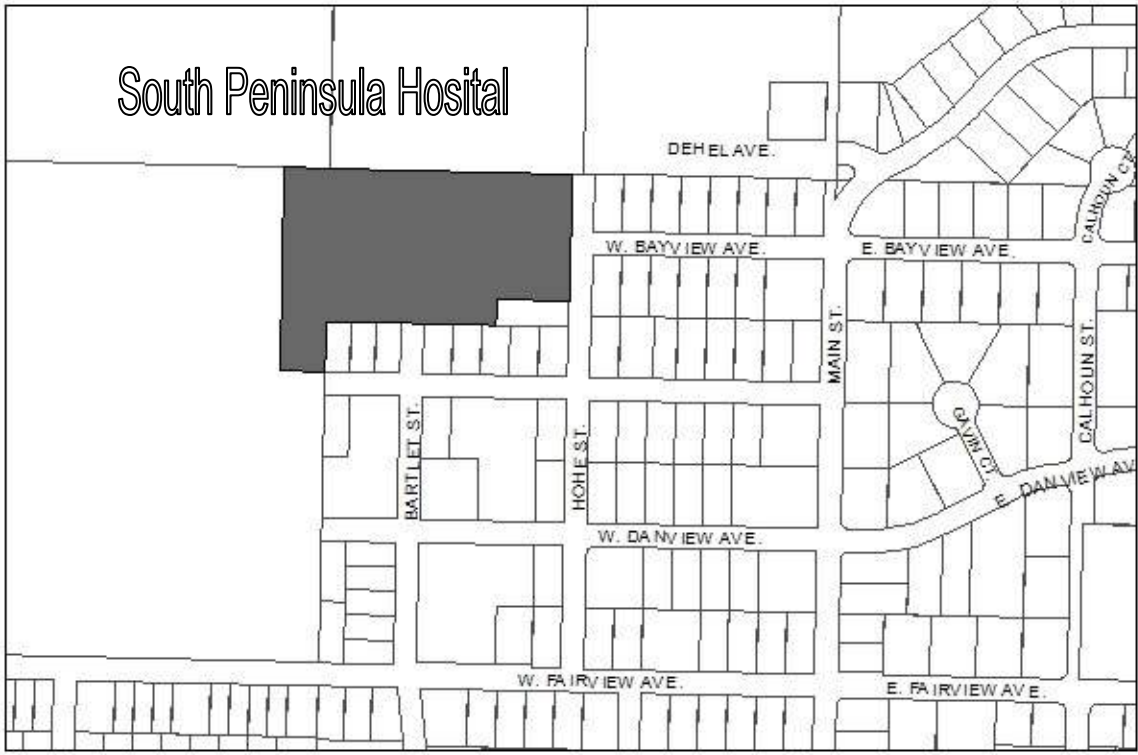
17714015: Heath/Whitmore Deed 3-71

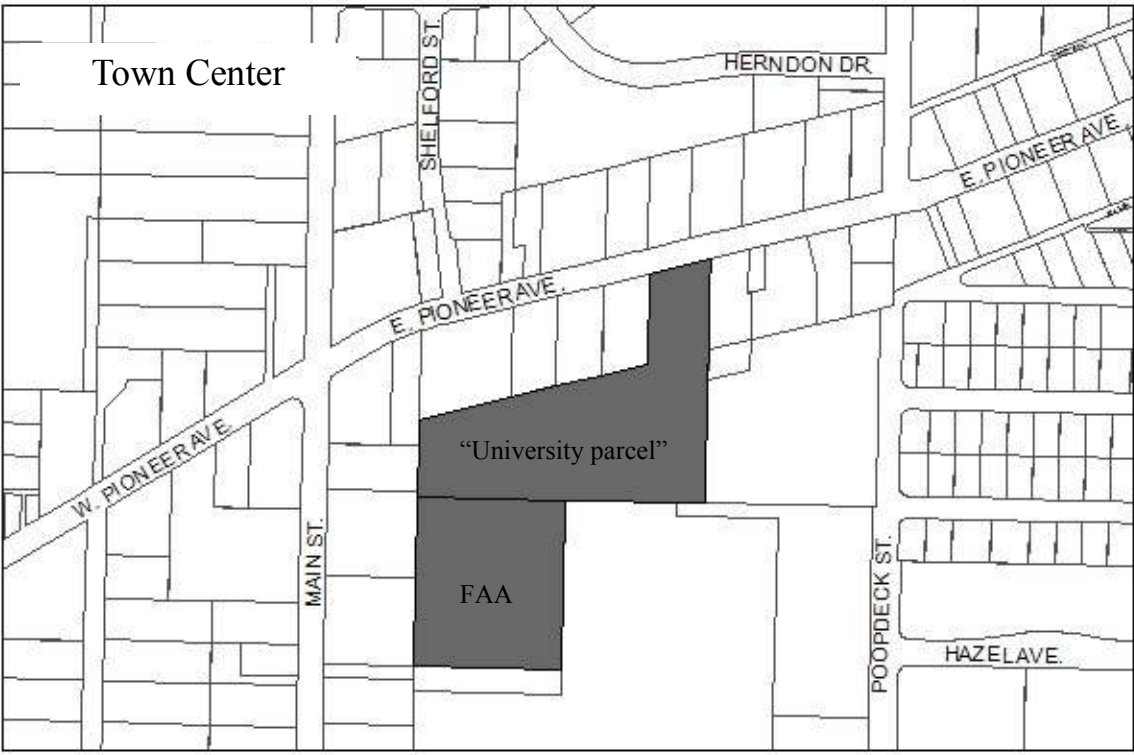
2008 Resolution 08-48 recommends a replat to vacate common lot lines. Resolution 10-35(A) Replat the Sewer Treatment Plant lots to vacate the common lot line. Staff note: additional funding is required to pay for replatting.

Lower section within a FEMA mapped flood hazard area.

Finance Dept. Code:

Public Works Beluga Slough tidal flats. Zoned Open Space Recreation. Tidal wetland.	
Designated Use: Public Works Acquisition History: Heath Dead 3/10/71	
Area: 30 acres	Parcel Number: 17714016
2015 Assessed Value: \$3,284,500 (Land: \$1,812,100, Structures: \$1,472,300)	
Legal Description: T 6S R 13W 4EC 20 SEWARD MERIDIAN HM NE1/4 NE1/4 SW1/4 & S1/2 NE1/4 SW1/4	
Zoning: Central Business/Open Space	Wetlands: Yes
Infrastructure: Paved Road, water and sewer	
Notes: Within a FEMA mapped flood hazard area. Lower portion of lot also nominated for inclusion in the Western Hemisphere Shorebird Reserve network, Resolution 15-064. 2015/16: Equipment shed constructed, Conditional Use Permit 15-02.	
Finance Dept. Code:	

	
Designated Use: South Peninsula Hospital Acquisition History:	
Area: 7.12 acres	Parcel Number: 17504024
2012 Assessed Value: \$19,943,500 (Land \$256,400, Structures \$19,687,100)	
Legal Description: HM02008092T06S R13W S18 SOUTH PENINSULA HOSPITAL SUB 2008 Addition Tract A2	
Zoning: Residential Office	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	
Notes: Ordinance 2006-036 leased the land to the Kenai Peninsula Borough for 99 years. Structure is owned by KPB.	
Finance Dept. Code:	

	
Designated Use: UA land: Land was sold to the City by UA with the intent it would be used for town center. FAA site: Held for possible UA/state shared consortium library agreement and land trade for land at Bridge Creek. Resolution 14-084 Identifying Homer FAA Site Sub Tract 38A in the Town Center as a Viable Location for a Community Center. Acquisition History: UA: Ord 03-61 purchase.	
Area: 7.71 acres	Parcel Number: 17719209, 17708015
2009 Assessed Value: \$520,200	
Legal Description: Homer FAA Site Sub Tract 38A, UA lot: Portion of Nils O Svedlund Sub lot 7 tract B, long legal.	
Zoning: Central Business District	Wetlands: City had a wetland delineation done in 2006. There is about a 1/2 acre of wetlands between the two sites.
Infrastructure: Must be built as land is developed.	
Finance Dept. Code:	



Designated Use: Tidelands
Acquisition History:

Area: 6,784 acres

Parcel Number: 18107001, 17728001, 17528001
 1810125, 1810126

2012 Assessed Value: \$22,345,000

Legal Description: Portions of ATS 612

Zoning: Not zoned

Wetlands:

17728001—HM0742265 T06S R13W S29 ALASKA TIDELAND SURVEY 612 . 499.54 acres, \$83,200 assessed value. Patent title 1977, 84-25 Annexed by City.

17528001 HM0770064 T06S R14W S30 ALASKA TIDELANDS SURVEY NO 612 POR SEC 23 24 & POR SEC 19 & 30. 1641.24 acres. Assessed Value: \$83,400. City Granted Title 1977 under Preference Right effective 1/3/59 Ord 84-25 Annexed by City.

18107001—HM0770064 T07S R13W S14 ALASKA TIDELANDS SURVEY 612 THAT PORTION LYING WITHIN SEC 13 & 14 & 22 THRU 24 & 26 THRU 28 & 33 THRU 36 OF T06SR13W & WITHIN SEC 1 & 2 OF T07SR13W EXCLUDING THAT PORTION OF TIDELANDS VESTED TO STATE OF ALASKA & EXCE. 4753 acres. \$20,890,100, includes Pioneer Dock improvements

Patent 1974 002459-0 Book 80 Page 171

Mariner Park and Mud Bay were nominated by the City as Western Hemisphere Shorebird Reserve Sites in 1994 ("whissers"). They are recognized as sites of international importance. <http://www.whsrn.org/>

Finance Dept. Code:



Designated Use: Sell (Resolution 2009-33)

Acquisition History: Tax foreclosure (seawall) KPB Ord 02-41

Area: 1.66 acres

Parcel Number: 177177-06, 07

2009 Assessed Value: \$51,500 (combined value)

Legal Description: Lot 43 and 44, Oscar Munson Subdivision

Zoning: Rural Residential

Wetlands: Most of these lots are tidal and critical habitat.

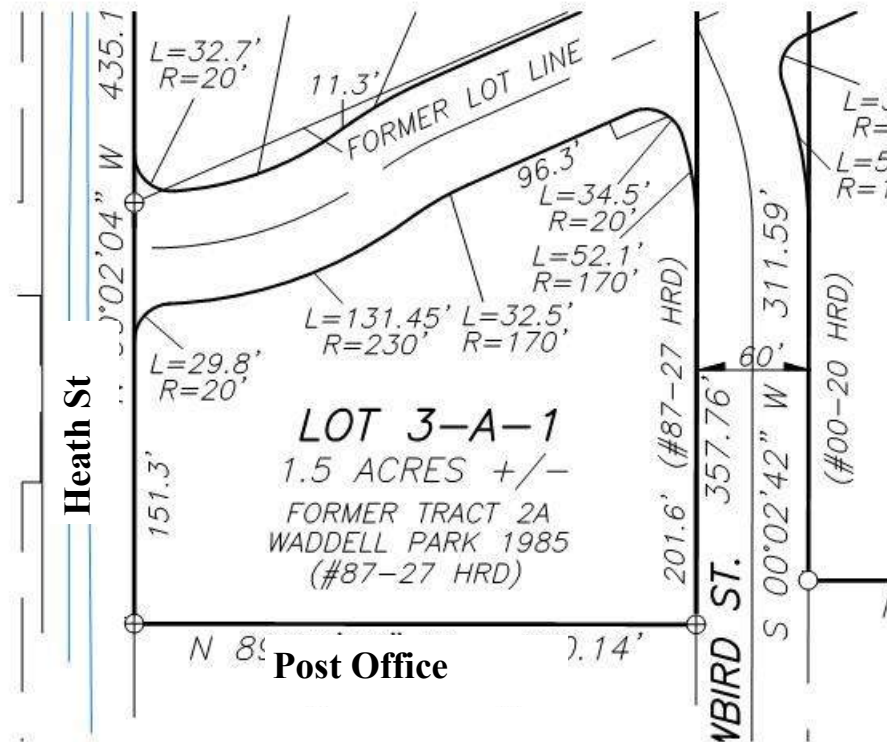
Infrastructure: Gravel road, water and sewer, seawall.

Notes: These lots contain seawall frontage. There is little to any developable area. There continues to be bluff erosion above the seawall on these lots. There are seawall and LIS assessments due on these properties. Contact Finance for payoff amounts. No commercial appraiser was willing to conduct an appraisal.

Resolution 2009-33: Sell Lots 43 and 44 Oscar Munson Subdivision.

February 2012 update: City Manager will put the lots out to bid in the spring, using the Borough assessment as the minimum bid instead of an appraisal. No local appraisers were able to appraise the property because there are no comparable properties, and the land has limited to no value for residential development.

Finance Dept. Code:



Designated Use: Sell, Ordinance 15-30

Acquisition History: Purchased

Area: 1.5 acres

Parcel Number: 17712034

2017 Assessed Value: \$145,100

Legal Description: T 06S R 13W SEC 20 Seward Meridian HM 2016021 WADDELL PARK 2016 REPLAT LOT 3- A-1

Zoning: CBD

Wetlands: N/A

Infrastructure: full utilities, Grubstake extension will include paved road and sidewalk.

Notes: Road construction in 2016. Project funding from State appropriation and matching City HART funds.

Finance Dept. Code:



Designated Use: Undesignated

Acquisition History: Detling Deed 6/10/82

Area: 0.03 acres each. Total of 2,613 sq ft

Parcel Number: 177154 02, 03

2015 Assessed Value: \$1,400

Legal Description: T6S R 13W SEC 20 SEWARD MERIDIAN HM 0670365 W R BENSON SUB AMENDED LOT 46 EXCLUDING HOMER BY-PASS ROAD, T 6S R 13W SEC 20 SEWARD MERIDIAN HM 0670365 W R BENSONS SUB AMENDED LOT 47 EXC HOMER BY-PASS RD*

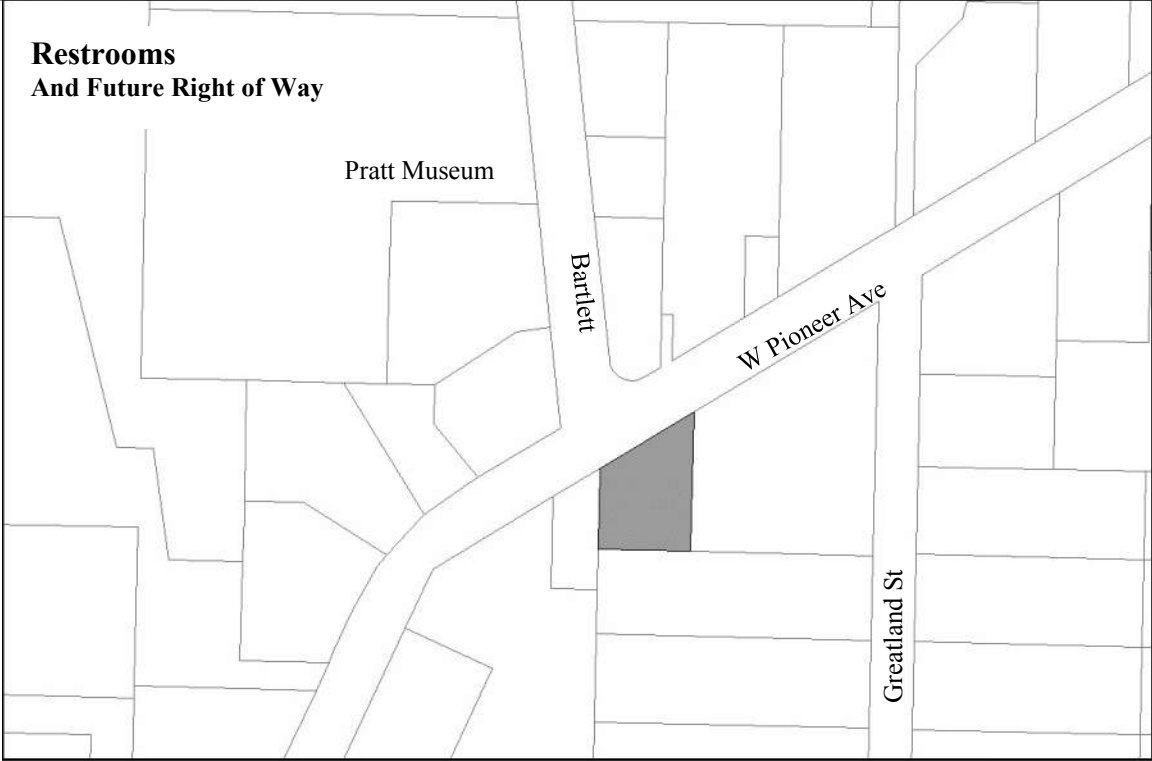
Zoning: Central Business District

Wetlands: Possibly. Lots are steep.

Infrastructure: Paved Road and sidewalk

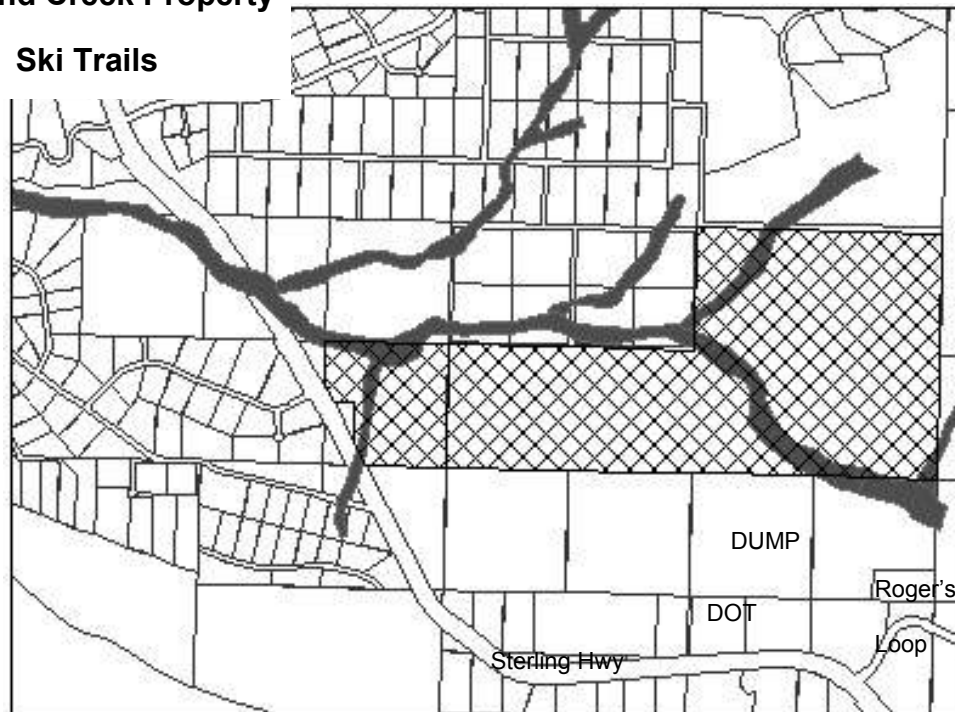
Notes: Lots are steep; they run from the Sterling Highway grade down the slope to the adjoining property. Lot dimensions are approximately 50'x30'.

Finance Dept. Code:

	
Designated Use: Restroom and Future right of way Acquisition History: Ordinance 2012-42	
Area: 0.27 acres	Parcel Number: 17514301
2015 Assessed Value: \$58,800	
Legal Description: T 6S R 13W SEC 19 SEWARD MERIDIAN HM 0000049 BUNNELLS SUB LOT 75	
Zoning: Central Business District	Wetlands: Yes
Infrastructure: Paved Road, water and sewer	
Notes: Public restroom constructed 2013-2014 Future road extension for Bartlett.	
Finance Dept. Code:	

Section E

Parks + Beaches
Cemeteries + Green Space

Diamond Creek Property**Ski Trails****Designated Use:** Public Purpose for park land**Acquisition History:** Ordinance 07-03. Forest Legacy grant/KHLT/long term public ownership**Area:** 273 acres (240 acres and 33 acres)**Parcel Number:** 17302201, 17303229**2015 Assessed Value:** \$325,100**Legal Description:** HM T06S R14W S09 SE1/4 EXCLUDING THE W1/2 SW1/4 SE1/4 SE1/4 and HM T06S R14W S10 SE1/4 & S1/2 SW1/4.**Zoning:** Not in city limits**Wetlands:** Yes. Diamond Creek flows through these lots. Larger lot is mostly wetland.**Infrastructure:** Limited legal and physical access. Western lot has Sterling Highway frontage.**Notes:** Ski trails, managed by Kachemak Nordic Ski Club

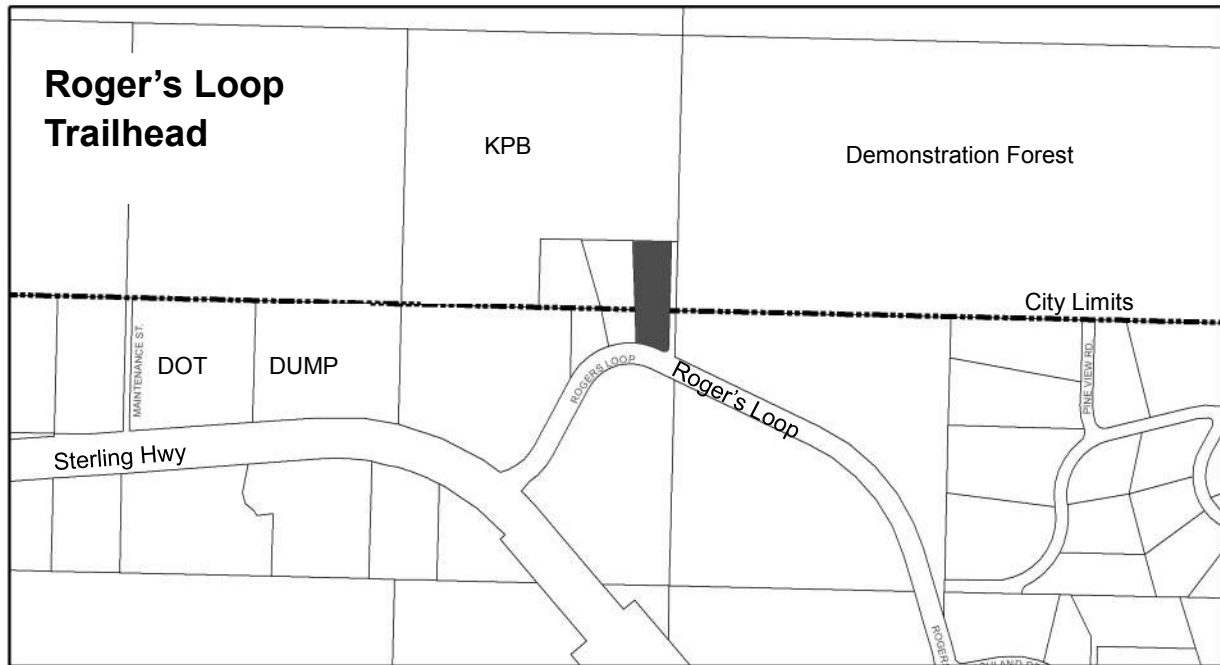
Acquisition notes: the Kachemak Heritage Land Trust purchased the property from the University of Alaska via a Forest Legacy Grant from the state of Alaska. The City accepted ownership of the land, to keep it for public park land in perpetuity, as required by the grant.

Conservation Easement Resolution 2010-48, Recording# 2010-003220-0

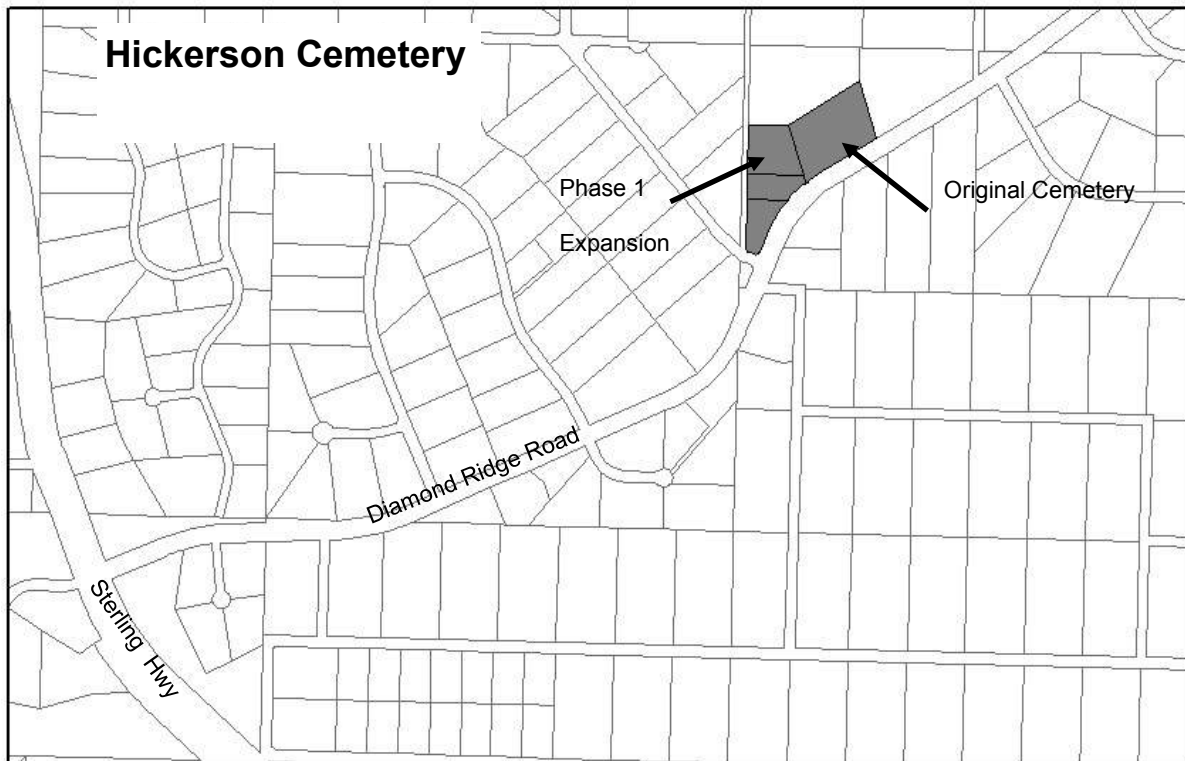
Resolution 13-055 Adopting the Diamond Creek Recreation Area Plan

The Plan was accepted by the State of Alaska Forest Legacy Program on 11/19/2014. Management and development of the property must follow the adopted and approved plan.

Finance Dept. Code:



Designated Use: Roger's Loop Trailhead Acquisition History: Ordinance 14-51(A)	
Area: 2 acres	Parcel Number: 17316066, 1736067
2016 Assessed Value: \$49,300	
Legal Description: T 06S R 14W SEC 15 SEWARD MERIDIAN HM 2011022 BISHOP SURVEY J G EVANS ADDN LOT 1	
Zoning: Rural Residnetial. Lot is split by city limits	Wetlands: none
Infrastructure: Paved road access	
Notes: Purchased in 2016 with HART Trail funds (\$63,465.85). Future trailhead to city owned Diamond Creek lands	
Finance Dept. Code:	



Designated Use: Hickerson Memorial Cemetery

Acquisition History: Deed American Legion Gen Buckner Post 16 4/23/70. Ordinance 10-30

Area: 6.91 acres

Parcel Number: 17321011, 13, 14, 15

2015 Assessed Value: \$196,700 (Land \$184,800, Structure \$11,900)

Legal Description: HM0631146 T06S R14W S03 TICE ACRES SUB HICKERSON MEMORIAL CEMETERY. Tice Acres Replat No 1, lots 11-A, 11B & 11-C

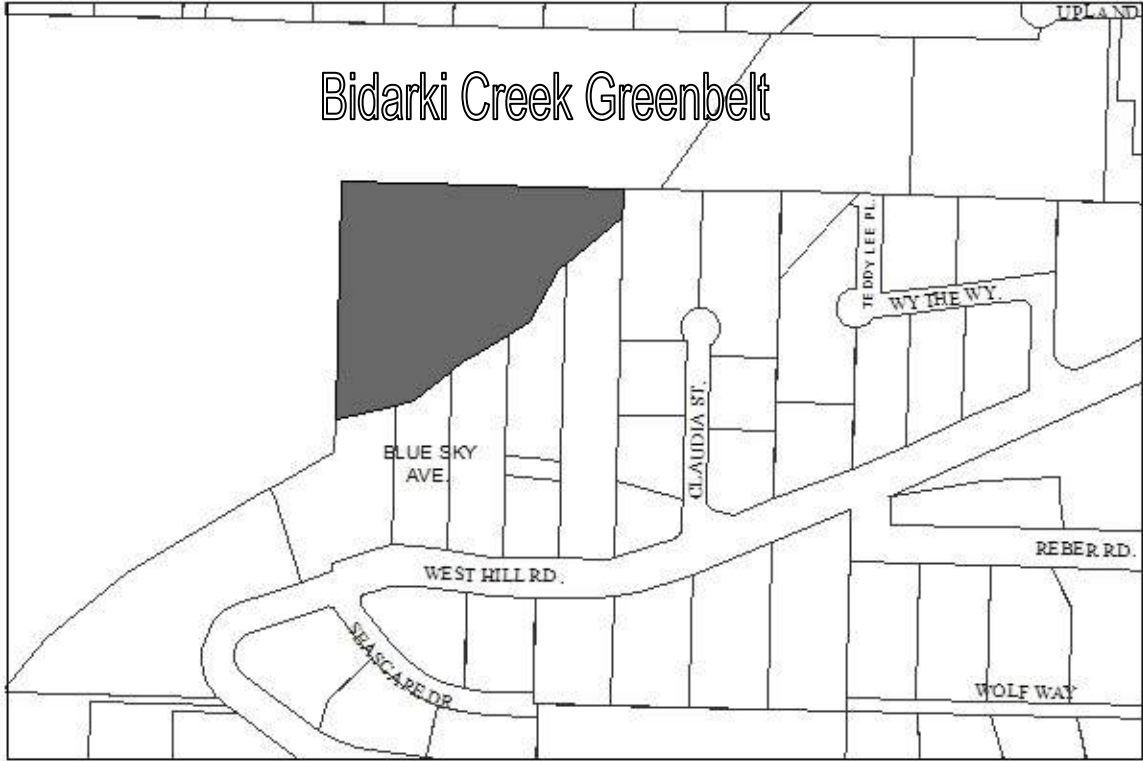
Zoning: Not within city limits

Wetlands: N/A

Infrastructure: paved access

Notes: Lots 11 A, 11B, and 11C purchased for \$205,000 Ordinance 10-30.
2017: Phase 1 cemetery expansion completed.

Finance Dept. Code:

	
Designated Use: Public Purpose. Retain as undeveloped Greenbelt and to protect drainage. Acquisition History: KPB Ordinance 83-01	
Area: 6.57 acres	Parcel Number: 17503025
2015 Assessed Value: \$10,600	
Legal Description: HM T06S R14W S13 SW1/4 SE1/4 NORTH OF SKYLINE DRIVE EXCLUDING SKYLINE DR SUB	
Zoning: Rural Residential	Wetlands: Bidarki Creek runs through the lot
Infrastructure: No access, no utilities	
Notes: Much of the lot is very steep gorge, down to Bidarki Creek. One portion may be developable at the north end. Slope there is approximately 15%. There is no legal or physical access to the land at this time.	
Finance Dept. Code:	

	
Designated Use: Public Use/Emerald Highland Estates Park Acquisition History: Gangle Deed, 12/1989	
Area: 1.04 acres	Parcel Number: 17502056
2015 Assessed Value: \$50,800	
Legal Description: HM0770024 T06S R14W S13 EMERALD HIGHLAND ESTATES SUB UNIT 3 LOT 1B BLOCK 3	
Zoning: Rural Residential	Wetlands: The whole lot is potential wetlands. Creek present long western property line.
Infrastructure: Gravel road access	
Notes: This land was deeded to the city by the original subdivider. However, there is a plat note restricting the use of the park to residents within the subdivision. Historically the city has not wanted to provide any services to a park that is not explicitly open to the public. The solution is for each property owner in the subdivision to quitclaim deed their interest in the subdivision park, so the City has clear title. History: Resolution 2004-24A, Land Allocation Plan Resolution 2007-03 Emerald Park Master Plan	
Finance Dept. Code:	



Designated Use: W.R.Bell Public Park.

Acquisition History: Gifted by Daughter, Dene and Husband Edward Reber 8/20/1970

Area: 2.75 acres

Parcel Number: 17524006

2009 Assessed Value: \$81,800

Legal Description: HM0700402 T06S R13W S18 TRACT E W R BELL SUB

Zoning: Rural Residential

Wetlands: Drainages on lot.

Infrastructure: Gravel road access. Rough trails across property.

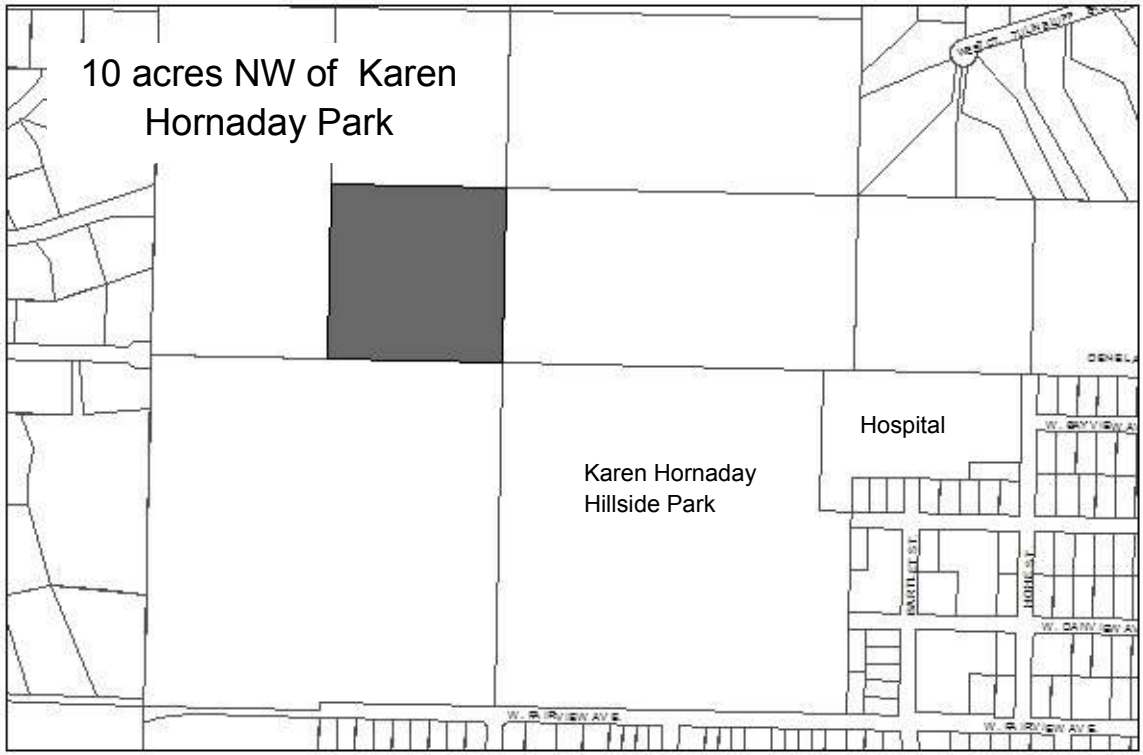
Notes:

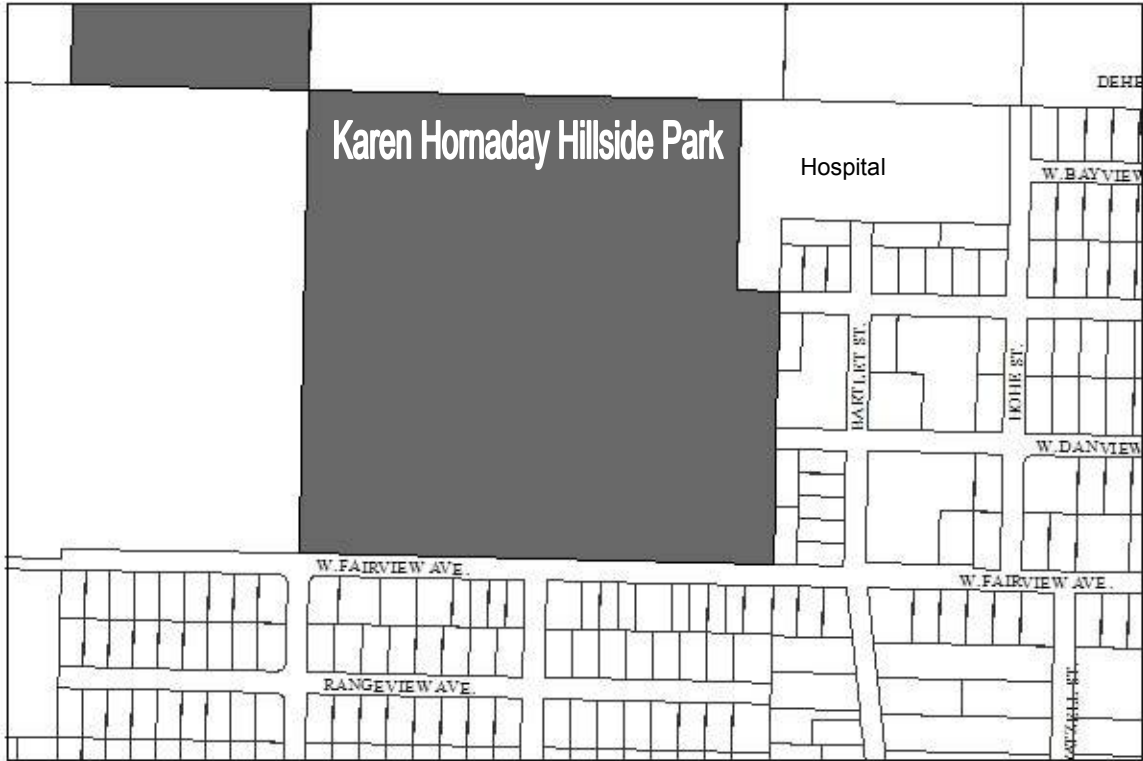
Park contains the gravesite of W.R. Bell.

It can be expected that the land to the south will become a housing development. Some homes will be accessed from W Fairview Ave.

2009: Completion of Reber Trail, with HART funds and a state trails grant.

Finance Dept. Code:

	
Designated Use: Retain for a future park Resolution 2011-37(A) Acquisition History:	
Area: 10 acres	Parcel Number: 17504003
2015 Assessed Value: \$56,800*	
Legal Description: T6S R13W Sec 18 SE1/4 NE1/4 SW1/4	
Zoning: Rural Residential	Wetlands: Drainages and wetlands may be present
Infrastructure: None. No access.	
Notes: *2007—Land could not be appraised by private appraisal due to lack of legal access.	
Finance Dept. Code:	

	
Designated Use: Public Recreational Purpose/Karen Hornaday Hillside Park Acquisition History: Homer Fair Association, Deed 8/1966 with covenants	
Area: 38.5 acres	Parcel Number: 17504023
2015 Assessed Value: \$155,000 (Land \$43,000 Structure \$112,000)	
Legal Description: HM0980004 T06S R13W S18 THAT PORTION OF SW1/4 SE1/4 EXCLUDING SOUTH PENINSULA HOSPITAL SUB 2008 Addn	
Zoning: Open Space Recreation	Wetlands: Some drainages
Infrastructure: Water, sewer and road access	
Notes: The park has been part of two Land and Water Conservation Fund grants: 1980, #02-00270, and 2011/12, #02-00408. Land to remain parkland in perpetuity. Campground, ball fields, day use picnic and playground area. Resolution 09-59(A) adopted the park master plan.	
Finance Dept. Code: 175.0003 (driveway, parking), 175.0007 (campground)	



Designated Use: Public Purpose/Bayview Park/Water tank access

Acquisition History: Large lots: Klemetsen Warranty Deed 5/8/67. Water tank access and part of Bayview Park.

Area: 0.58 acres total

Parcel Number: 175051 07, 08
17726038, 17727049

2015 Assessed Value: \$95,900 total

Legal Description: 17505107: HM0562936 T06S R13W S18 TRACT A FAIRVIEW SUB LOT 2
17505108: HM0562936 T06S R13W S18 TRACT A FAIRVIEW SUB LOT 1
17726038: HM0760026 T06S R13W S17 KAPINGEN SUB UNIT 3 PARK RESERVE
17727049: HM0770065 T06S R13W S17 ISLAND VIEW SUB PARK

Zoning: Urban Residential

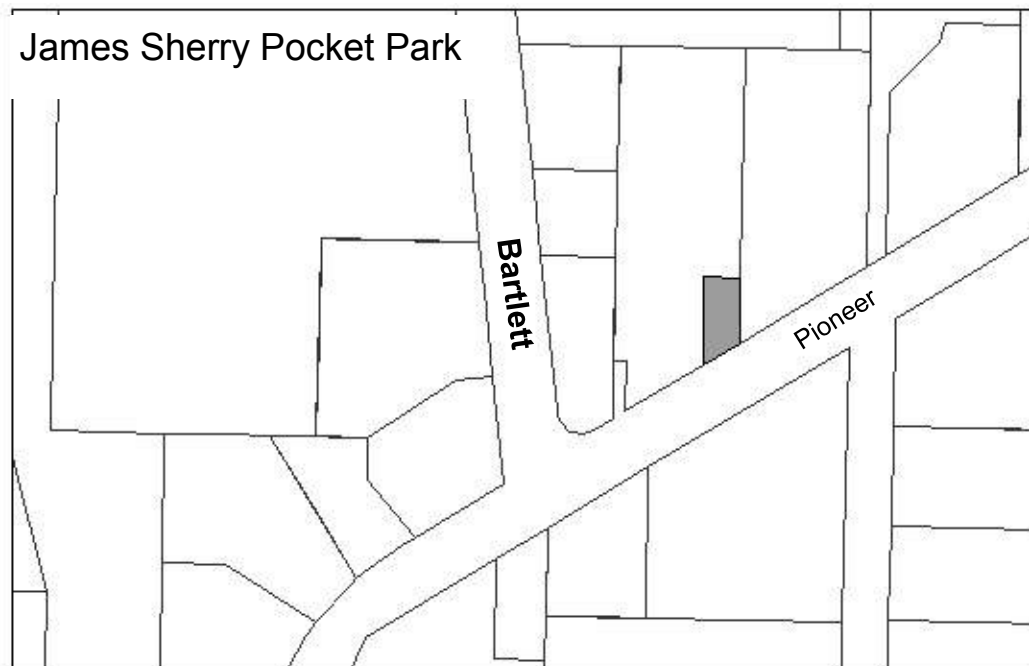
Wetlands: N/A

Infrastructure: Paved road access, water, sewer

Notes:

Finance Dept. Code:

Designated Use: ROW and Woodard Park Acquisition History: ROW: Purchased for Harrington Heights LID, Ord 2000-13(S) 7/2000. Woodard Park: Tax Foreclosure (Harry Gregoire), Park designation enacted in Reso 04-53	
Area: ROW 0.85 acres Woodard Park: .025 acres	Parcel Number: 17513329 17513328
2015 Assessed Value: ROW: \$79,700, Park: \$40,600	
Legal Description: ROW: HM0860044 T06S R13W S19 BUNNELL'S SUB NO 17 LOT 12-A Woodard Park: HM0860044 T06S R13W S19 BUNNELL'S SUB NO 17 LOT 11-B	
Zoning: Residential Office	Wetlands: Woodard Creek and wetlands present
Infrastructure: Paved access on Bartlett. Part of completed Spruceview Road LID. Water and sewer present.	
Notes:	
Finance Dept. Code: ROW: 500.0051 Park:	



Designated Use: Retain for use as public park or parking

Acquisition History: Ord 83-01 (KPB)

Area: 0.06 acres or 2,766 sq ft

Parcel Number: 17514235

2015 Assessed Value: \$13,100

Legal Description: T 6S R 13W SEC 19 SEWARD MERIDIAN HM 2007124 BUNNELLS SUB NO 21 LOT 37F-1

Zoning: Central Business District

Wetlands: Ditch across property

Infrastructure: Water and Sewer, paved sidewalk

Notes:

HEA/phone company utility infrastructure on lot—big green boxes.

Finance Dept. Code:



Designated Use: WKFL Park

Acquisition History: Asaiah Bates Deed 3/88

Area: 0.31 acres

Parcel Number: 17720204

2015 Assessed Value: \$70,300

Legal Description: Glacier View Subdivision No 1 Replat of Lots 1, 8 & 9, Block 4 Lot 9-A

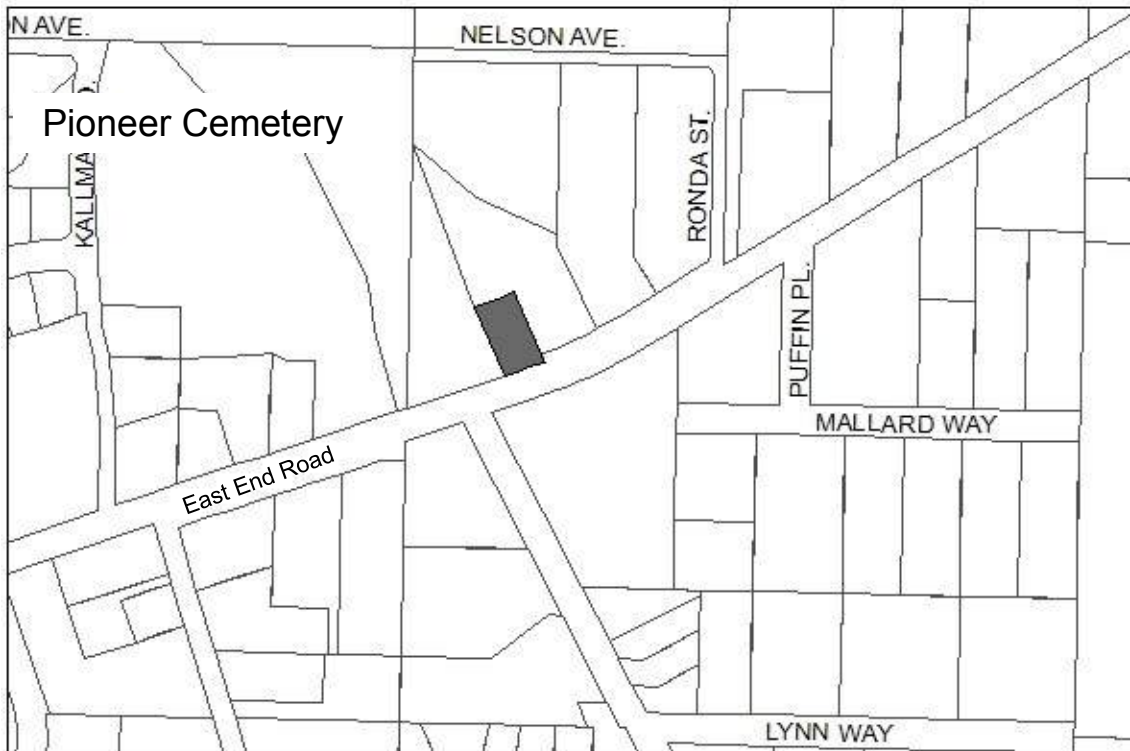
Zoning: Central Business District

Wetlands: N/A

Infrastructure: Water, paved road, electricity

Public restroom constructed in 2013.

Finance Dept. Code:



Designated Use: Pioneer Cemetery

Acquisition History: Quitclaim Deed Nelson 4/27/66

Area: 0.28 acres

Parcel Number: 17903007

2009 Assessed Value: \$26,400

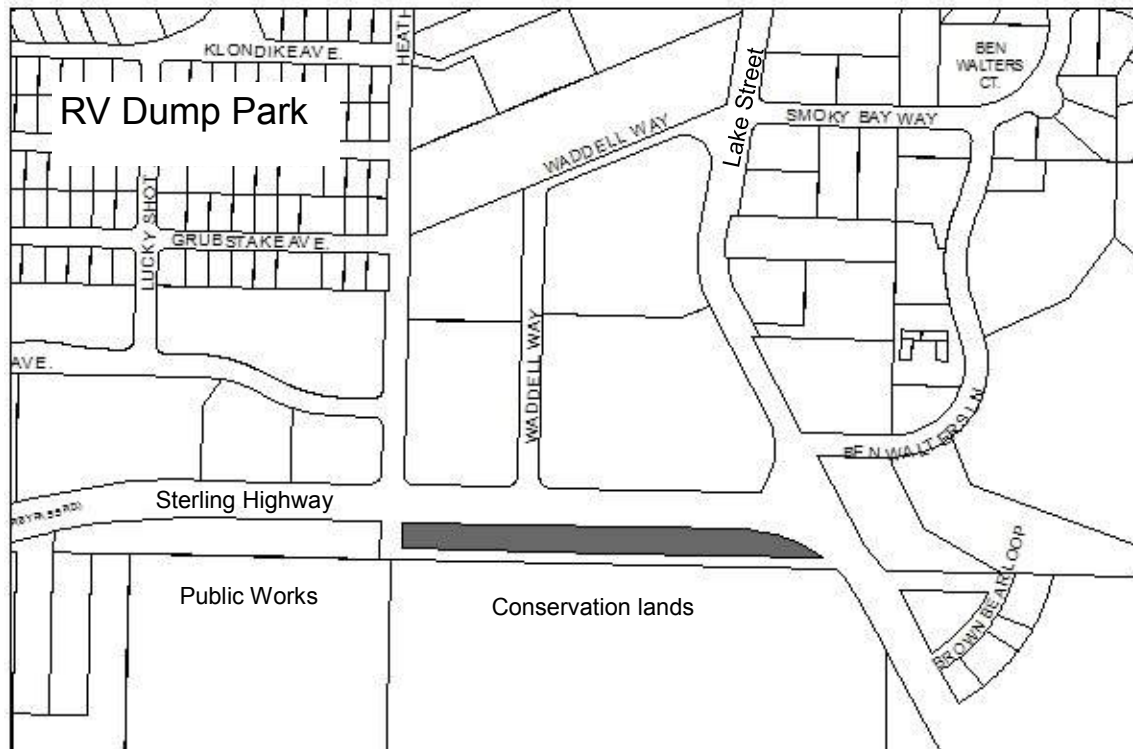
Legal Description: James Waddell Survey of Tract 4 Lot 4A

Zoning: Residential Office

Wetlands: N/A

Infrastructure: Paved Road

Finance Dept. Code:



Designated Use: RV Water/Dump station

Acquisition History: Deed states "Waddell Park Tract"

Area: 1.73 acres

Parcel Number: 17712014

2015 Assessed Value: \$356,700

Legal Description: Waddell Subdivision, portion S of Homer Bypass Road

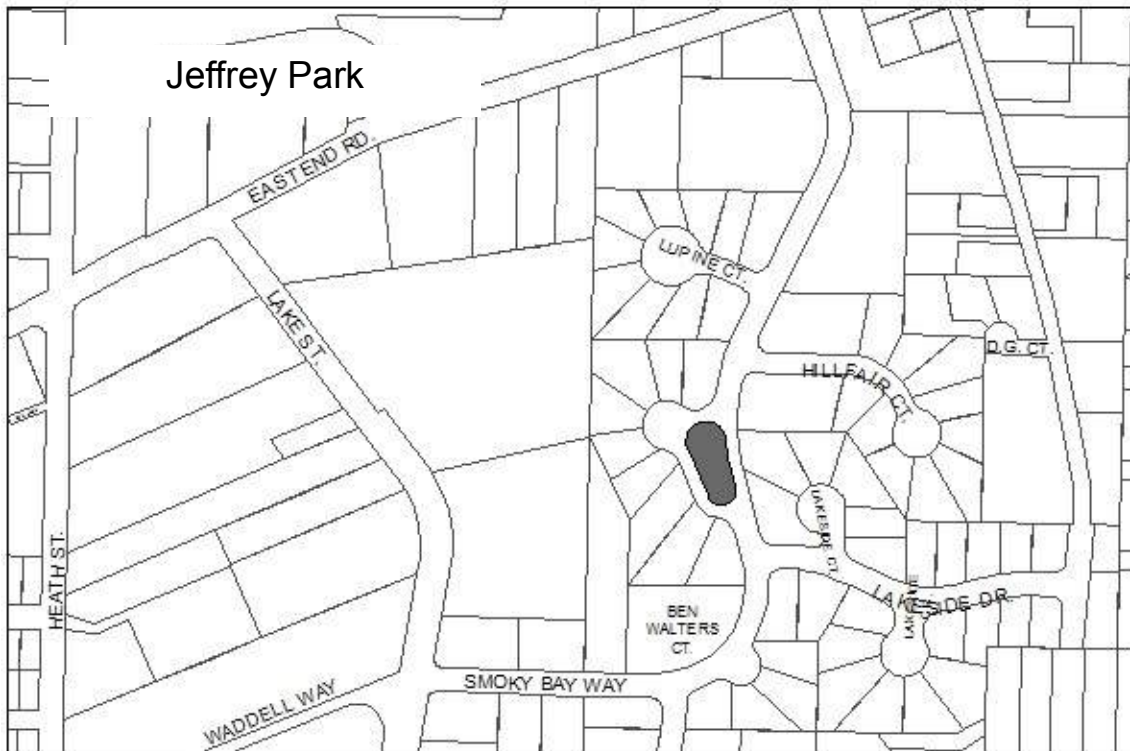
Zoning: Central Business District

Wetlands:

Infrastructure: Water, Sewer, gravel/paved access

Notes: Part of Land and Water Conservation Project #02-00263.4, signed January 1983. Land to remain in park status in perpetuity.

Finance Dept. Code:



Designated Use: Public Purpose/Greenbelt/Jeffrey Park

Acquisition History: Ordinance 83-27 (KPB)

Area: 0.38 acres

Parcel Number: 17730251

2015 Assessed Value: \$51,200

Legal Description: Lakeside Village Amended Jeffrey Park

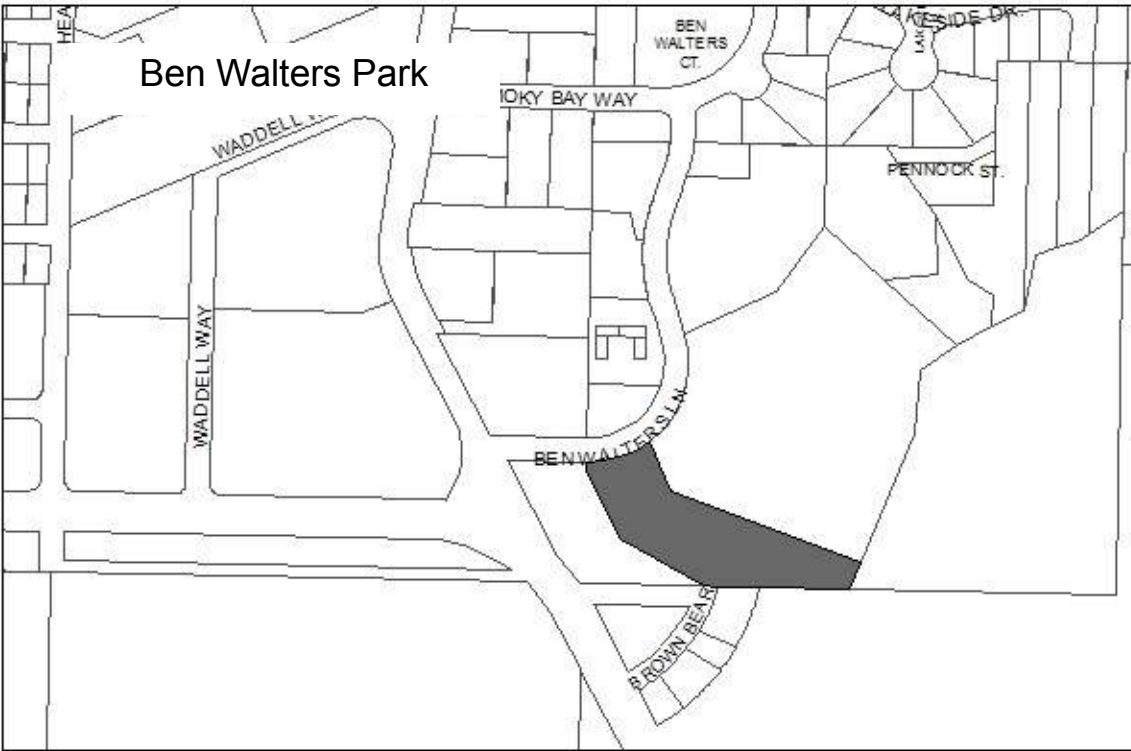
Zoning: Urban Residential

Wetlands:

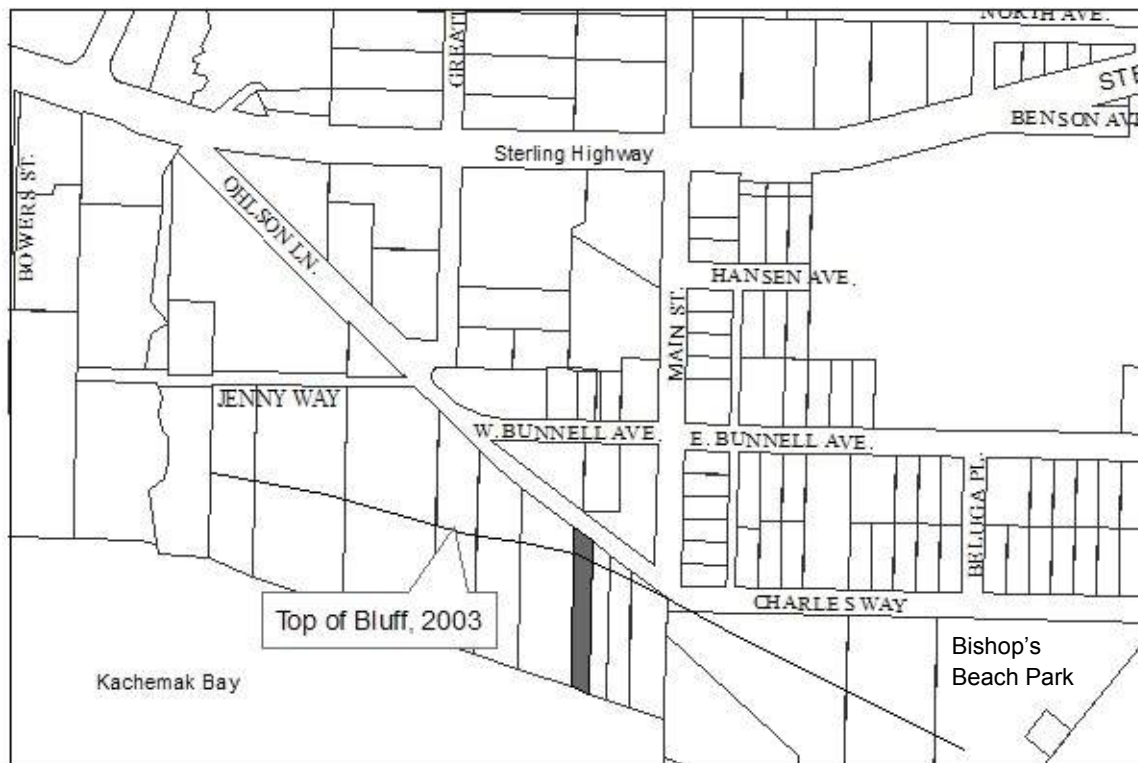
Infrastructure: Paved Road, water, sewer

Notes: Neighborhood park. Grass and new swing sets installed in 2005. Fill brought in to the park to raise the ground level and deal with drainage issues in 2007.

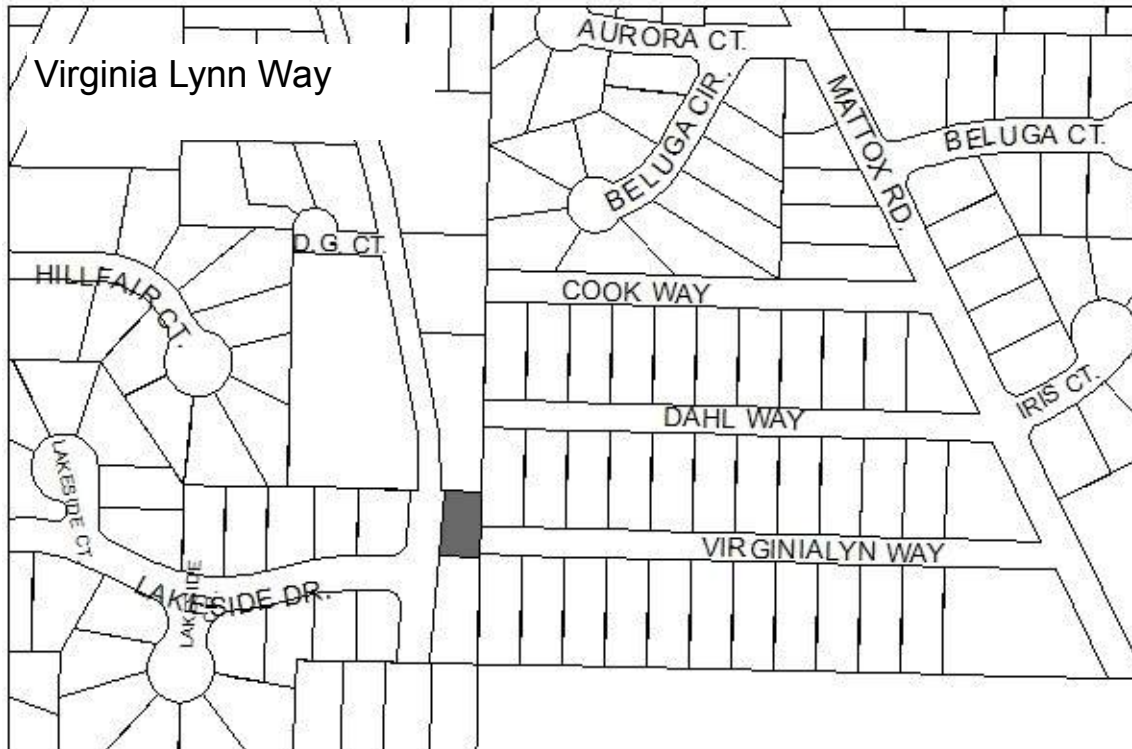
Finance Dept. Code:

	
Designated Use: Ben Walters Park. Public park or greenbelt per deed. Acquisition History: Reso 83-22(S) Neal Deed 5/4/83. Donated. Deed amended 6/1/83.	
Area: 2.48 acres	Parcel Number: 17712022
2009 Assessed Value: \$493,200 (Land \$493,200, Structure \$44,200)	
Legal Description: Lakeside Village Park Addition Replat Lot 1A-2	
Zoning: Central Business District	Wetlands: 3664 Ben Walters Lane
Infrastructure: Paved Road, water and sewer. Public restrooms, covered fire pit, lake access and dock.	
Notes: In May 1982, a project agreement was executed for a Land and Water Conservation Fund project to develop the park. Project #02-00305. Land to remain park in perpetuity. New swing set installed, 2008. New dock installed in 2009.	
Finance Dept. Code:	

	
Designated Use: Bishop's Beach Park Acquisition History: McKinley Warrant Deed 1/9/1984	
Area: 3.46 acres	Parcel Number: 17714010
2015 Assessed Value: \$471,700 (Land \$465,300, Structure \$6,400)	
Legal Description: HM T06S R13W S20 PTN GL 2 BEGIN S 1/16 CORNER SECS 19 & 20 & NW CORNER LOT 2 TH S 89 DEG 57'30" E 600 FT ALONG N BOUND LT 2 TO POB TH S 0 DEG 2' E 391 FT TO CORNER 2 ON MHW KACHEMAK BAY TH S 59 DEG 30' E 150 FT TO CORNER 3 TH N 38 DEG 0' E	
Zoning: Central Business District	Wetlands: Some wetlands (along boardwalk). Flood hazard area.
Infrastructure: Paved road access. No water or sewer. City maintained outhouses.	
Notes:	
Finance Dept. Code:	



Designated Use: City Park	
Acquisition History: Donated by Herrick, Resolution 90-7	
Area: 0.32 acres	Parcel Number: 17520009
2015 Assessed Value: \$16,700	
Legal Description: HM T06S R13W S19 PORTION THEREOF S OF OLSEN LANE	
Zoning: Central Business District	Wetlands: None. Bluff property.
Infrastructure: Gravel Road access, no water or sewer	
Notes: Resolution 15-030(A), Designate as park	
Finance Dept. Code: 392.0008	



Designated Use: Public use easement for Virginia Lynn Way, public park

Acquisition History: Quit Claim Deed from NBA 1/4/83

Area: 0.21 acres

Parcel Number: 17730239

2015 Assessed Value: \$32,100

Legal Description: T 6S R 13W SEC 20 SEWARD MERIDIAN HM 0840005 LAKESIDE VILLAGE SUB AMENDED LOT 2 BLK 4

Zoning: Urban Residential

Wetlands: possibly on a small portion

Infrastructure: Road access

Notes: This lot has a public use easement granted by the plat. This lot will likely be needed in the future to connect Virginia Lynn Way, because the adjacent lots are not wetlands and are developable. Access to Mattox Road is not known at this time; the ground drops and becomes very swampy.

Resolution 09-33: Dedicate road access for Virginia Lynn Way, across Lot 2 Block 4 Lakeside Village Subdivision Amended. Hold the remainder of the lot for use as a public neighborhood park. In 2009 the City retained a surveyor to work on this issue. 2010: professional opinion was given that no right of way dedication is required, however, a legal opinion may be sought to determine city liability outside a dedicated right of way, Spruceview Ave is a similar situation: a roadway is constructed across a parcel, not within a right of way.

Finance Dept. Code:



Designated Use: Jack Gist Ball Park

Acquisition History: Warranty Deed Moss 8/27/98

Area: 14.6 acres

Parcel Number: 17901023

2015 Assessed Value: \$109,200

Legal Description: HM0990063 T06S R13W S15 JACK GIST SUB LOT 2

Zoning: Rural Residential

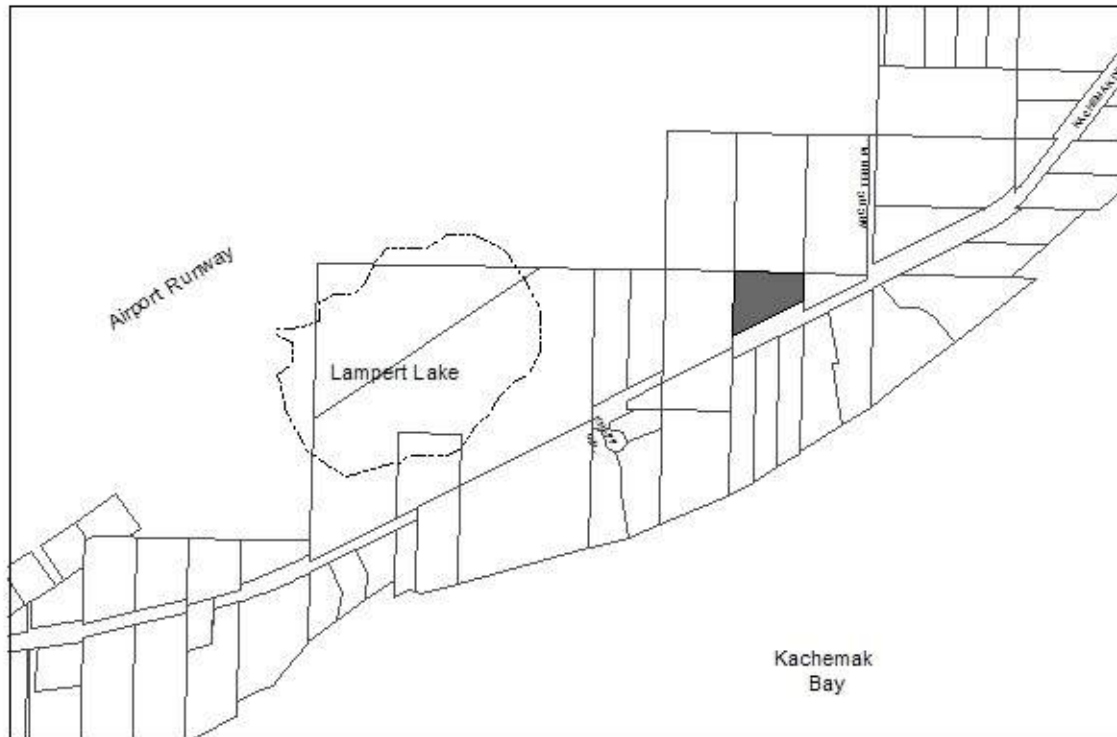
Wetlands: May be present. Site is mostly fill and old dump.

Infrastructure: Gravel road access.

Notes: Old dump site. Land and Water Conservation Fund Grant Project #02-00369 for construction of 3 ball fields and parking area. Land to remain parkland in perpetuity.

No water or sewer to service the new ball fields. Parking lot constructed in 2006. 2009: ord 09-35(A) allocated \$33,000 for improvements to two ballfields.

Finance Dept. Code:



Designated Use: Future Kachemak Drive Trail and rest area Resolution 2011-37(A)

Acquisition History: Ord 96-16(A) (KPB)

Area: 1.65 acres

Parcel Number: 17936020

2015 Assessed Value: \$31,700

Legal Description: Scenic Bay Lot 4

Zoning: General Commercial 2

Wetlands: 100% Wetlands

Infrastructure: Paved Road, city water and sewer

Notes: Part of Kachemak Drive Phase 3 water and sewer SAD

Finance Dept. Code:



Designated Use: Resolution 15-030(A): Sell
Acquisition History: Lot 1: Ordinance 97-06(S) KPB

Area:
 Harry Feyer Subdivision Lot 1: 0.39 acres

Parcel Number: 17910001, 17911005

2015 Assessed Value: \$30,900 (lot 1)

Legal Description: Harry Feyer Subdivision Lot 1

Zoning: Rural Residential

Wetlands: none known

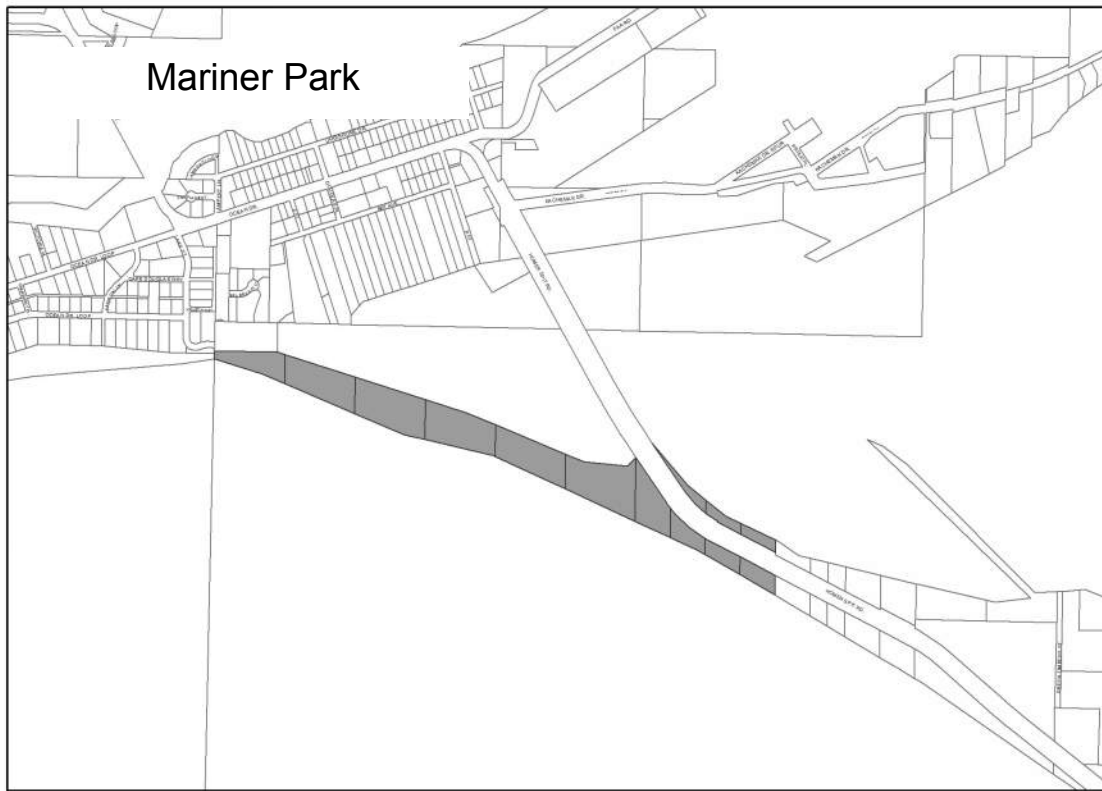
Infrastructure: Paved Road access, power.

Notes:

Has water and sewer assessments.

Resolution 15-030(A): For sale. Lot 1 has not yet sold.

Finance Dept. Code:



Designated Use: Park

Acquisition History: Lot 10: Simmons purchase, 1983. Other are EVOS purchases or unknown.

Area: 32.32 acres

Parcel Number: 18101002-14

2014 Assessed Value: \$272,100

Legal Description: T 6S R 13W SEC 28 SEWARD MERIDIAN HM GOVT LOTS 5-8, 10-15

Zoning: Open Space Recreation/Conservation

Wetlands: Tidal

Infrastructure: No infrastructure

Notes: Acquisition of Lots 5-8 and 11-15 should be researched to see how they were acquired. Possibly EVOS purchases.

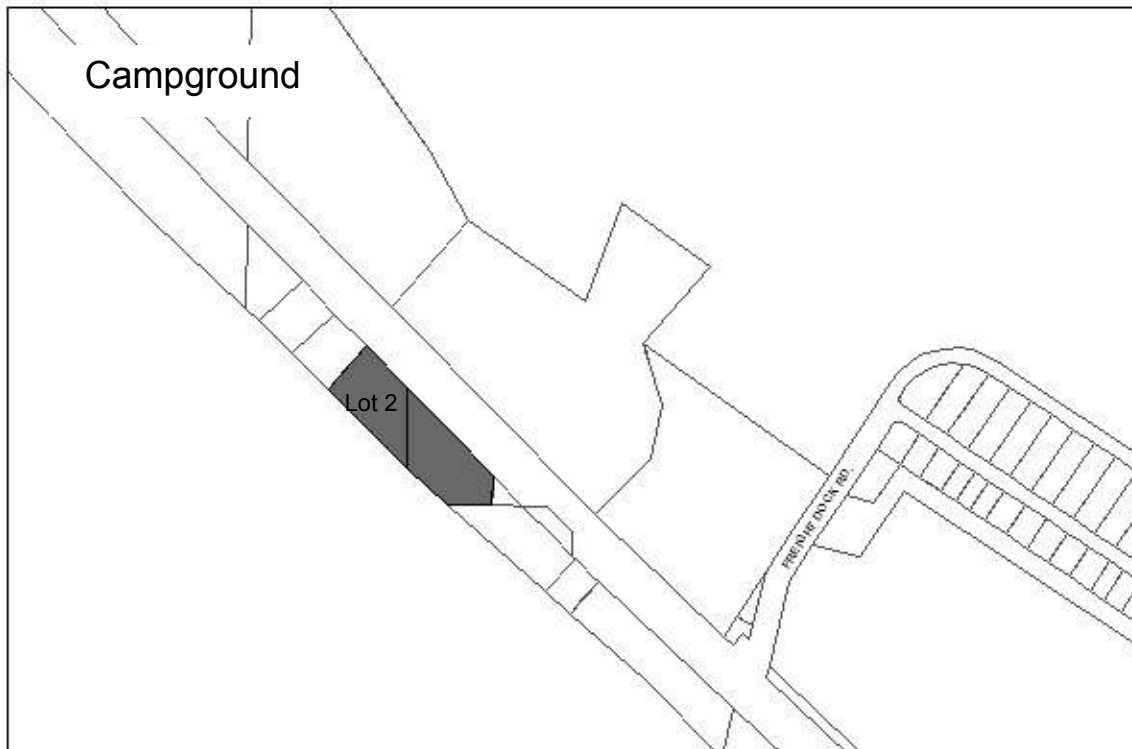
Mariner Park and Mud Bay were nominated by the City as Western Hemisphere Shorebird Reserve Sites in 1994 ("whissers"). They are recognized as sites of international importance. <http://www.whsrn.org/>

2012 Mariner Park driveway was relocated to the north.

Resolution 15-030(A): designate as park. Minutes of the meeting ask staff to research the deed history to see if there are long term conservations easements. 2017 update: it appears that none of the lands are EVOS purchases, according to the EVOS website.

2016: new campground office located at Mariner Park.

Finance Dept. Code:



Designated Use: Camping
Acquisition History:

Area: 3.92 acres (2.1 and 1.82 acres)

Parcel Number: 18103101, 02

2015 Assessed Value: \$427,100 (Includes value of the campground office which was removed in 2016)

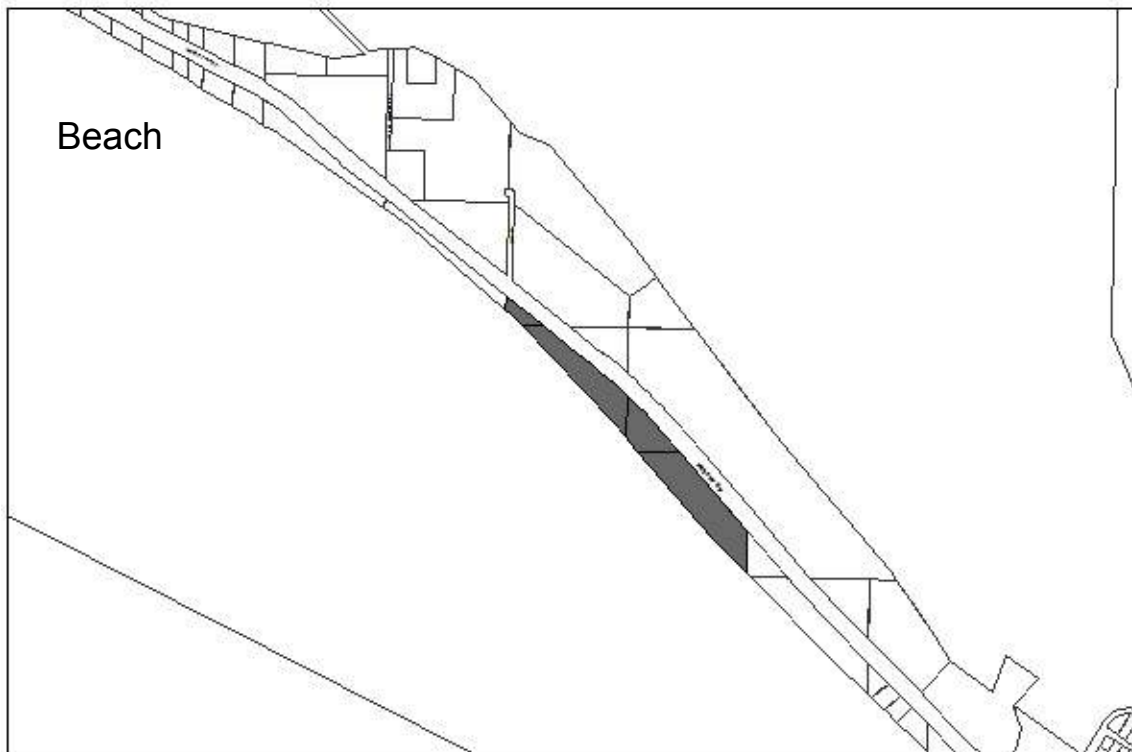
Legal Description: Homer Spit Subdivision Amended Lot 2, and that portion of Government Lot 14 lying south of the Homer Spit Road T6S R13W S35

Zoning: Open Space Recreation.

Infrastructure: Paved road, water and sewer

Notes: At most, 1/3 of the land is above the high tide line. The rest is beach or underwater.
 2016: Campground office sold and removed due to repeated erosion and storm damage.

Finance Dept. Code:



Designated Use: Public Use/ Open Space Recreation

Acquisition History: Ord 90-26 (KPB). Lot 6: EVOS purchase

Area: 23 acres

Parcel Number: 181030 02, 04, 06 18102011

2015 Assessed Value: \$388,300

Legal Description: T 6S R 13W SEC 35 SEWARD MERIDIAN HM PORTION GOVT LOT 1,2, Sec 34 Lot 1, lot 6 SW of Sterling Hwy Sec 27

Zoning: Open Space Rec

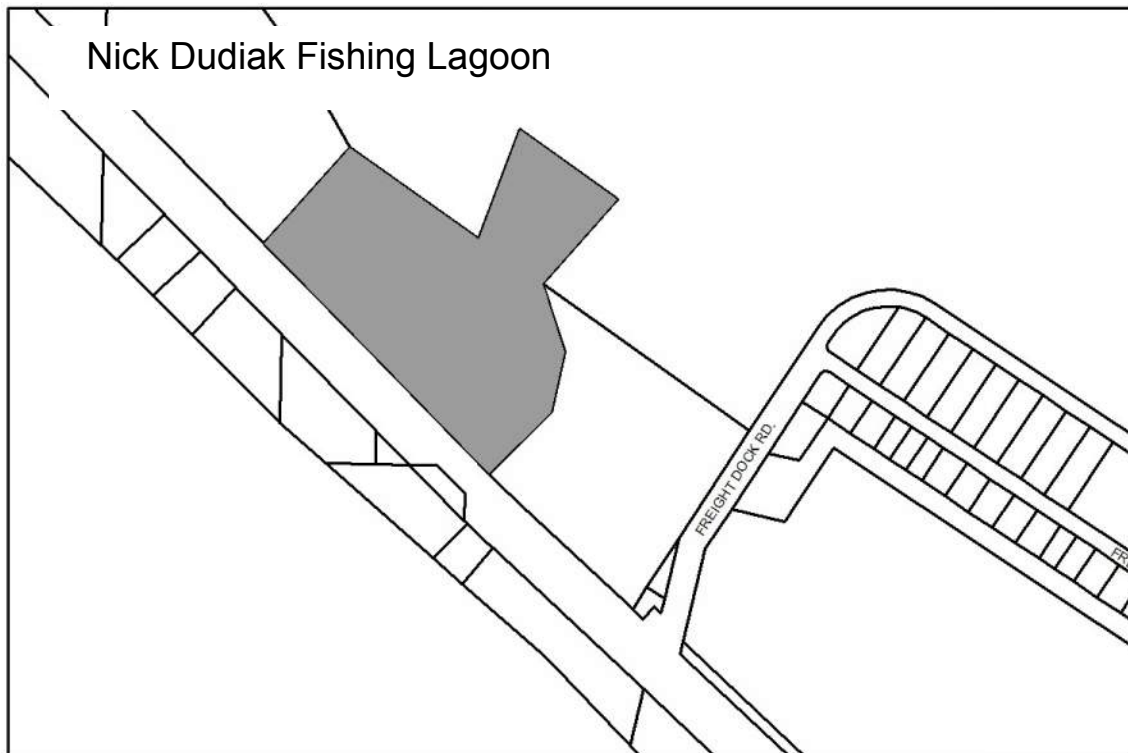
Wetlands: Tidal

Infrastructure: Paved Road access

Notes:

Acquisition history of lot 6 should be researched as budget allows

Finance Dept. Code:



Designated Use: Fishing Lagoon

Acquisition History: Ord 83-26 Purchase from World Seafood

Area: 17.71 acres

Parcel Number: 18103116

2009 Assessed Value: \$2,144,700

Legal Description: T 6S R 13W SEC 35 SEWARD MERIDIAN HM 0920039 THE FISHIN HOLE SUB TRACT 2

Zoning: Open Space Recreation

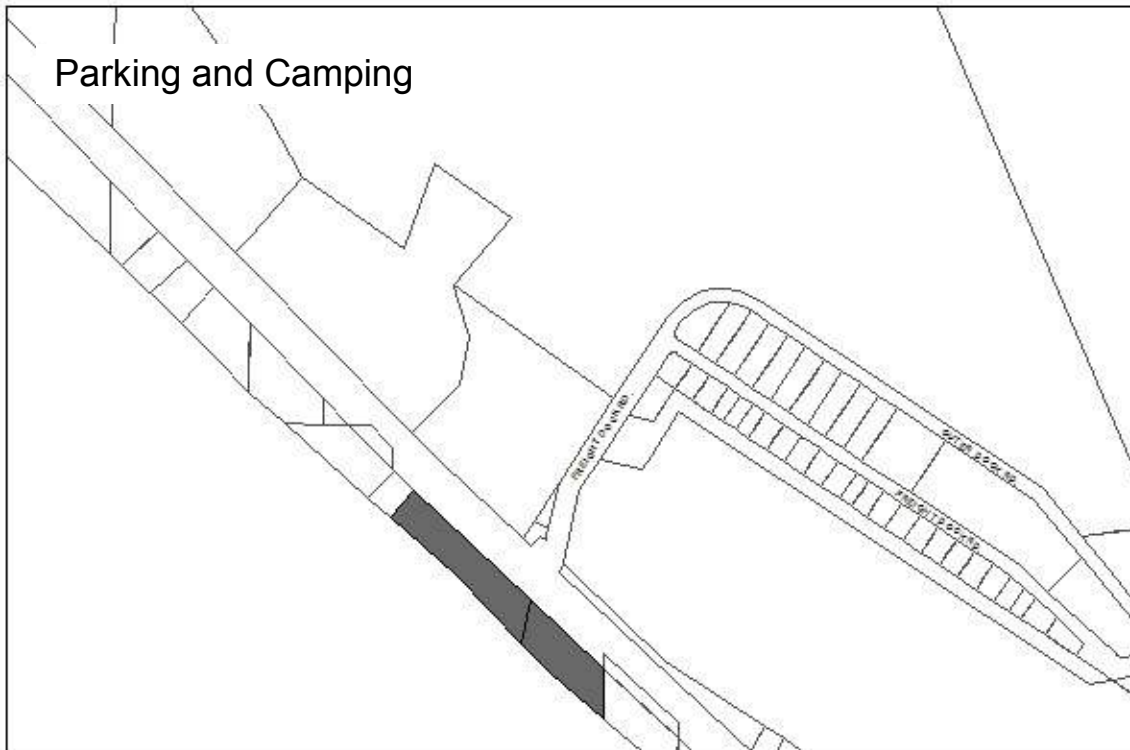
Wetlands: N/A. Portions in floodplain.

Infrastructure: City Water and Sewer, paved road access. Restroom.

Notes:

- Dredged in 2012
- 2016 construction of Kachemak Bay Water Trail shelter
- 2016 new fish cleaning tables built (ADFG funded)

Finance Dept. Code:



Designated Use: Western lot: Camping. East lot, parking
Acquisition History:

Area: 5.7 acres

Parcel Number: 18103301, 18103108

2015 Assessed Value: \$757,500

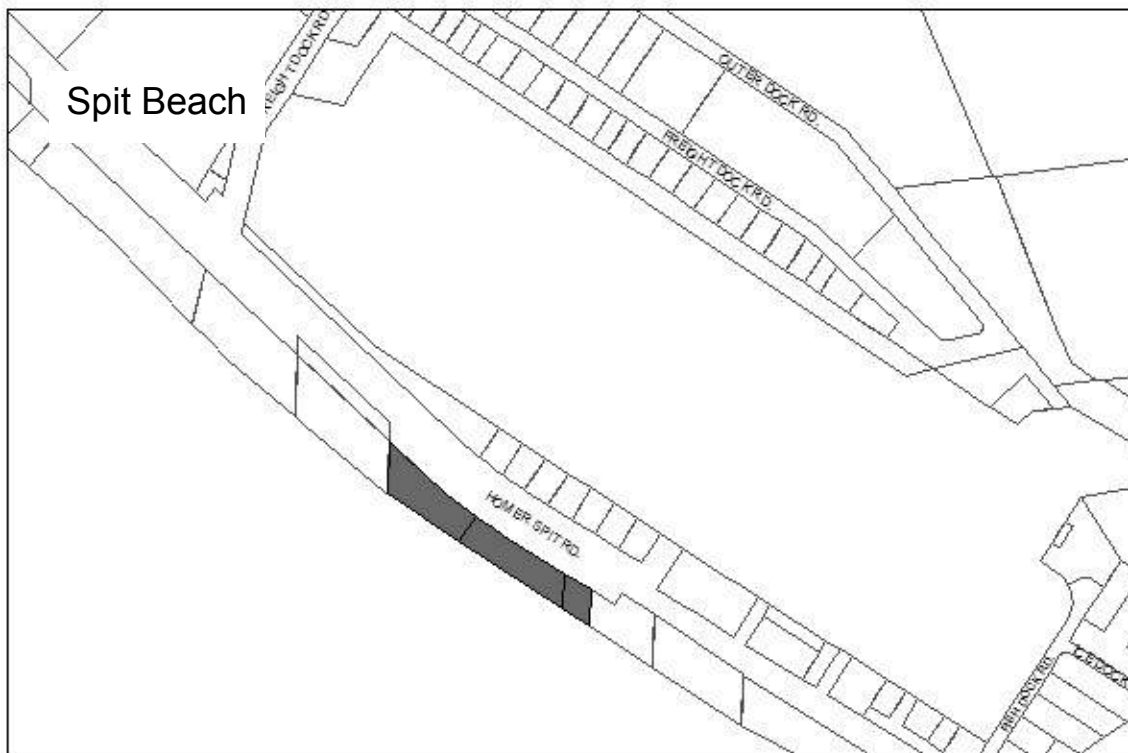
Legal Description: Homer Spit Amended Lots 7 and 9

Zoning: Open Space Recreation

Wetlands: N/A

Infrastructure: Paved Road

Finance Dept. Code:



Designated Use: Open Space Recreation

Acquisition History: Lot 11B: Reso 93-14, 3/24/93 Deed. Acquired through an exchange for lot 18.

Area: 2.36 acres

Parcel Number: 181033 4, 5, 6

2015 Assessed Value: \$400,800

Legal Description: Homer Spit Subdivision Amended Lots 11 and 20. Lot 11B of HM 0640816.

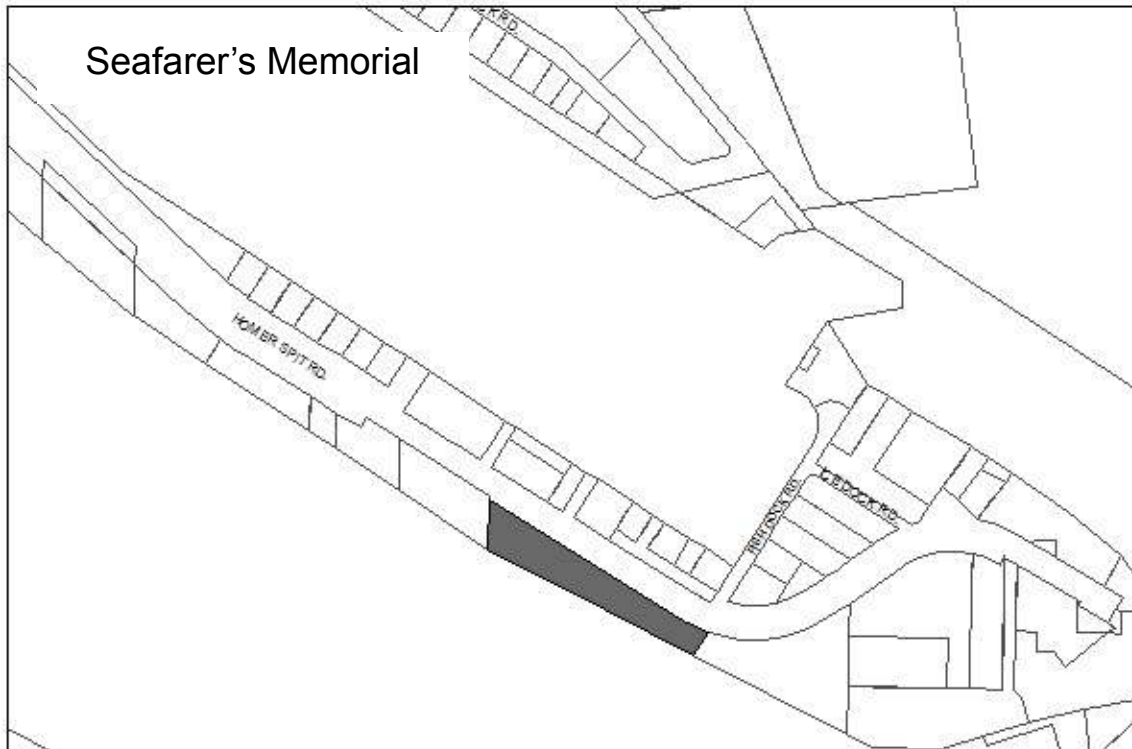
Zoning: Open Space Recreation

Wetlands: N/A

Infrastructure: Paved Road

Notes:

Finance Dept. Code:



Designated Use: Seafarer's Memorial and parking
Acquisition History:

Area: 2.52 acres

Parcel Number: 18103401

2009 Assessed Value: \$316,900

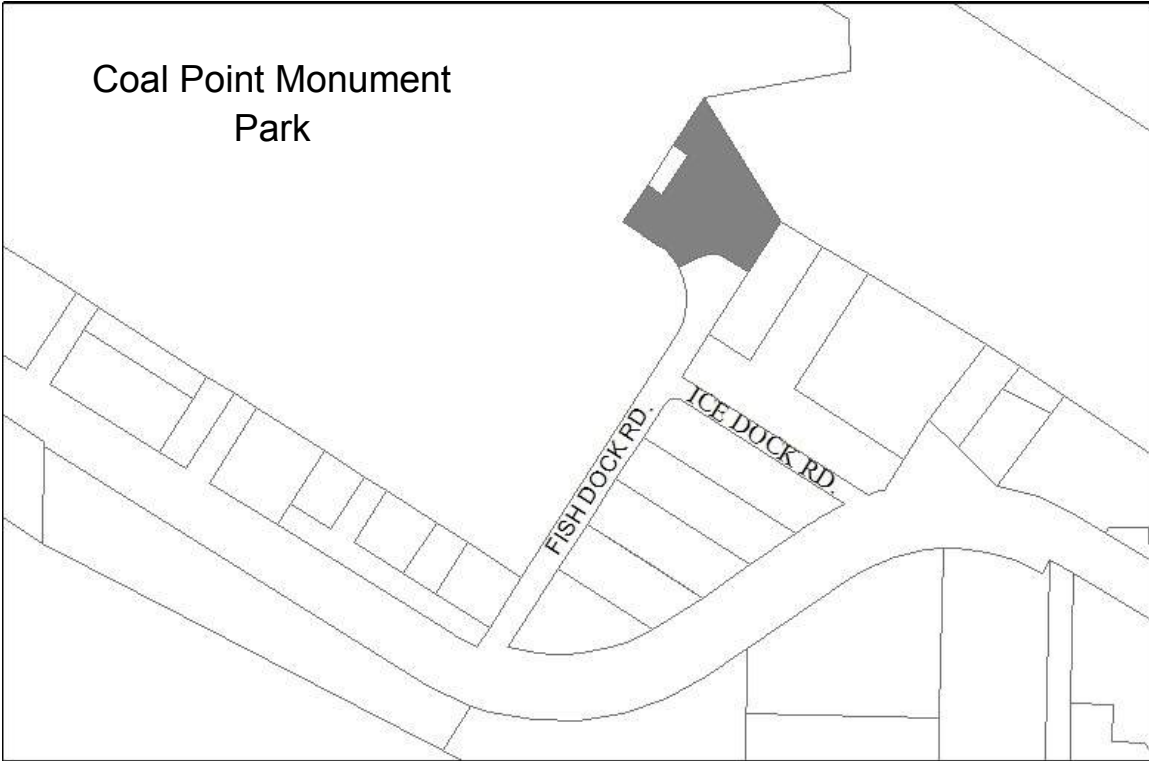
Legal Description: Homer Spit Amended Lot 31

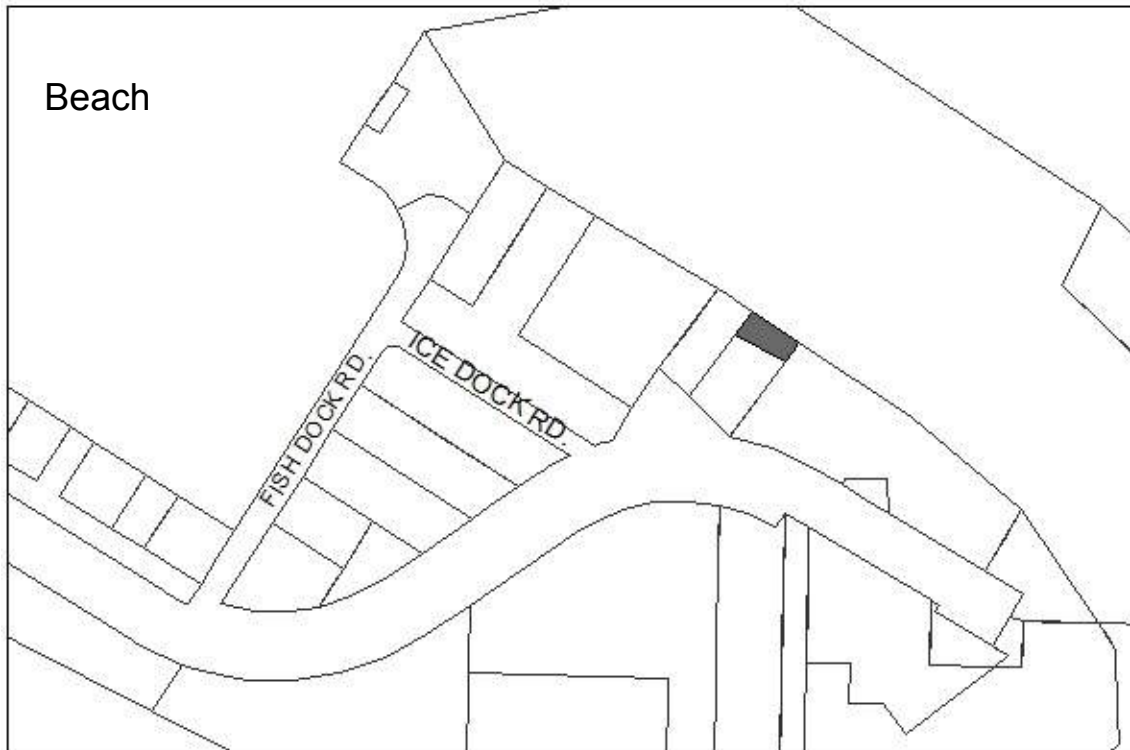
Zoning: Open Space Recreation

Wetlands: N/A

Infrastructure: Paved Road

Finance Dept. Code:

 Coal Point Monument Park	
Designated Use: Park Acquisition History:	
Area: 1.09 acres	Parcel Number: 18103426
2015 Assessed Value: \$280,000	
Legal Description: LEGAL T 7S R 13W SEC 1 SEWARD MERIDIAN HM 0890034 HOMER SPIT SUB AMENDED COAL POINT MONUMENT PARK EXCLUDING THAT PORTION AS PER LEASE AGREEMENT 187 @ 921	
Zoning: Marine Industrial	Wetlands:
Infrastructure: gravel parking area	
Notes: 	
Finance Dept. Code:	



Designated Use: Beachfront between Icicle and Main Dock

Acquisition History:

Area: 0.11 acres

Parcel Number: 18103446

2015 Assessed Value: \$44,700

Legal Description: T 7S R 13W SEC 1 SEWARD MERIDIAN HM THAT PORTION OF GOVT LOT 20 LYING NE OF THE HOMER SPIT RD & BOUNDED ON THE NW BY LOT 43 OF HOMER SPIT SUB AMENDED & BOUNDED ON THE NE BY ATS 612 & BOUNDED ON THE SE BY LOT 45 OF HOMER SPIT SUB AMENDED & BOUNDED ON THE

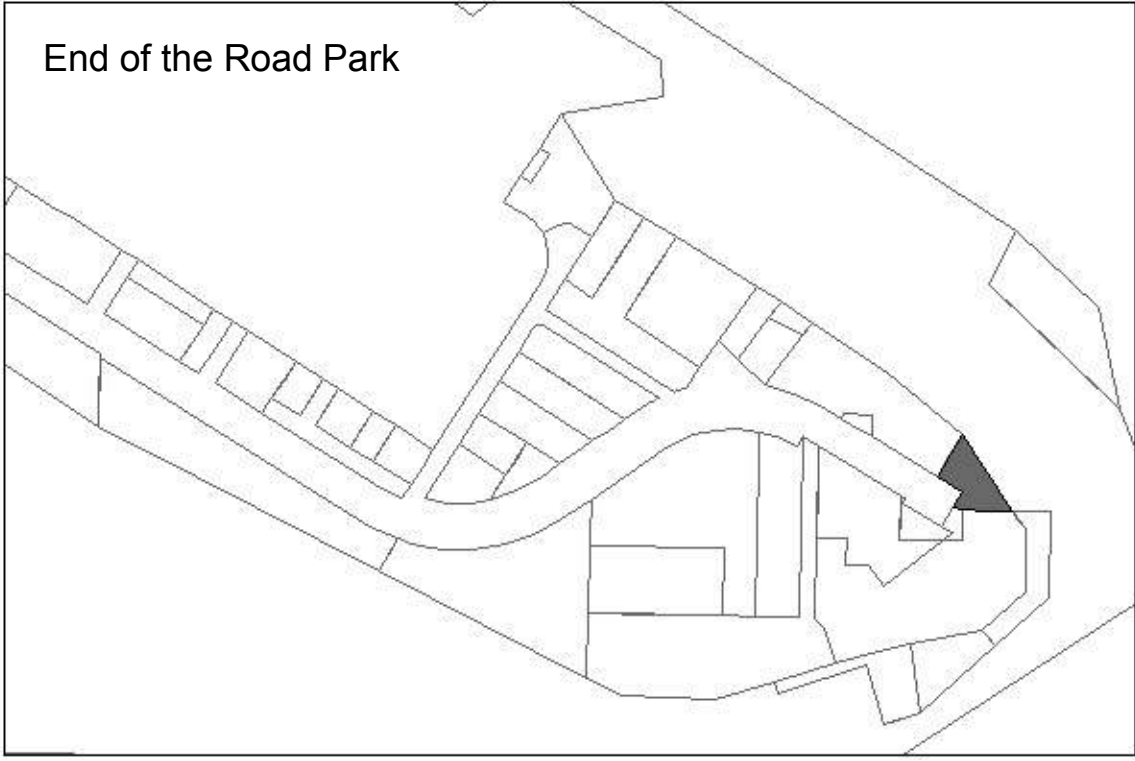
Zoning: Marine Industrial

Wetlands: N/A tidal, flood plain

Infrastructure:

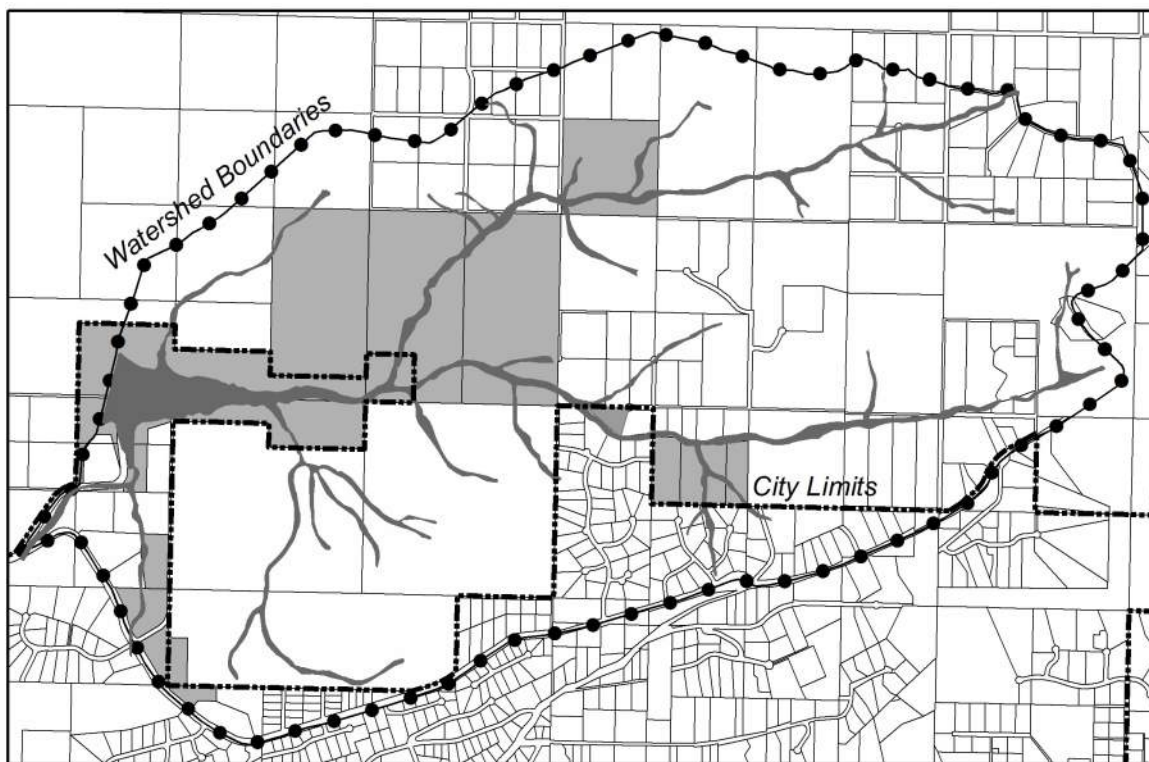
Notes:

Finance Dept. Code:

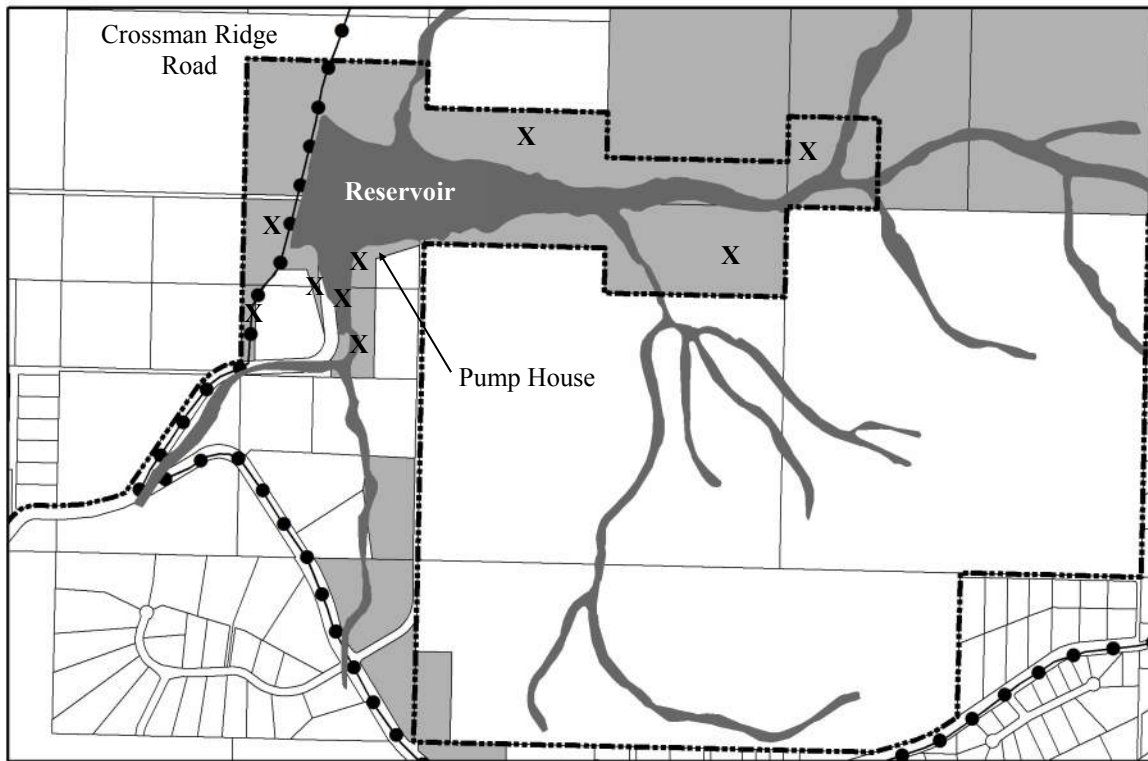
 End of the Road Park	
Designated Use: End of the Road Park Resolution 13-032 Acquisition History:	
Area: 0.43 acres	Parcel Number: 18103448
2015 Assessed Value: \$133,000	
Legal Description: HM0930049 T07S R13W S01 HOMER SPIT SUB NO 6 VELMA'S ADDN LOT 45-B	
Zoning: Marine Industrial	Wetlands: N/A
Infrastructure: Water, sewer, paved road access	Address:
• Restroom construction 2013/14, parking lot paved, and spit trail completed • Access easement granted to Land's End for fire egress, due to erosion of beach.	
Finance Dept. Code:	

City Lands within the Bridge Creek Watershed Protection District

These properties lie within the Bridge Creek Watershed Protection District. Not all the lands within the district are in Homer City limits. The city owns 22 lots totaling 438.46 acres with an assessed value in 2016 of \$5,067,300. Lands include conservation purchases from the University of Alaska, Bureau of Indian Affairs, Kenai Peninsula Borough tax foreclosure, private parties, and water system infrastructure such as the reservoir, pump house, and water treatment plant and tanks.



Section updated November 29, 2017



Designated Use: Bridge Creek Watershed, Reservoir and pump house

Acquisition History:

Area: 120.9 acres

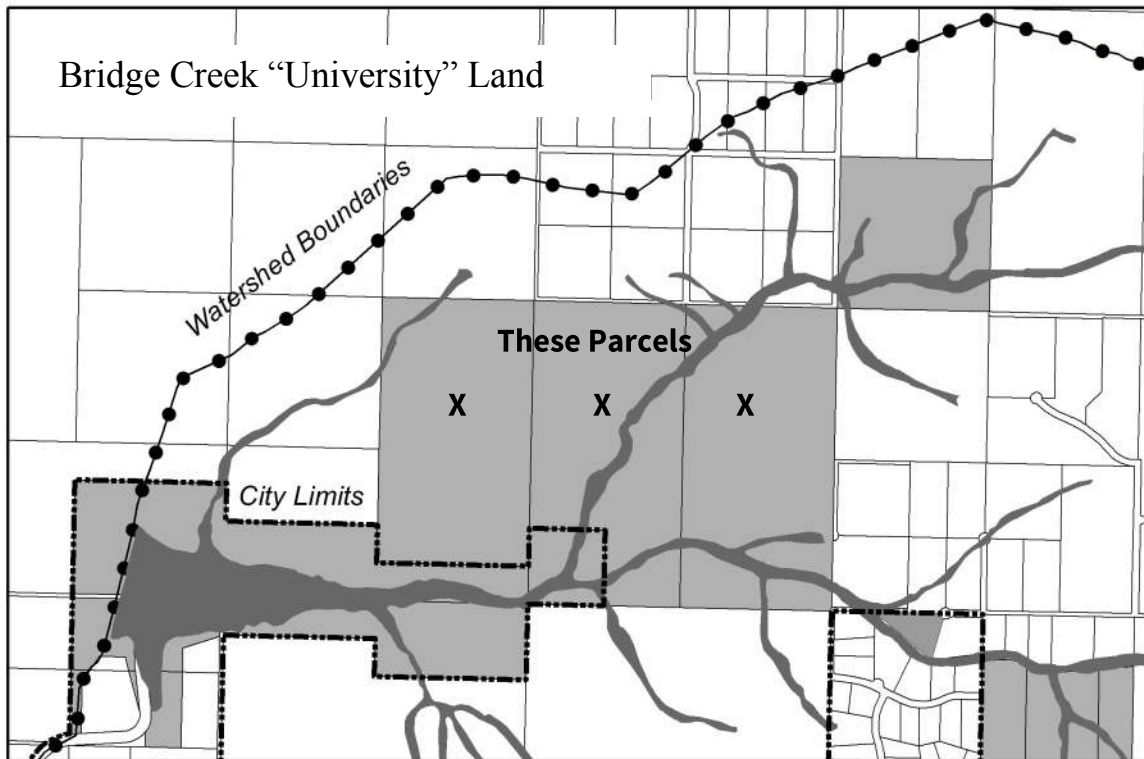
Zoning: Conservation

2015 Assessed Value: \$323,800

PARCEL ACREAGE LEGAL

17307053	0.410	T 6S R 13W SEC 7 SEWARD MERIDIAN HM 0711238 DIAMOND RIDGE ESTATES SUB LOT 2 THAT PORTION THEREOF LYING EAST OF DIAMOND RIDGE ROAD
17307057	1.470	T 6S R 13W SEC 7 SEWARD MERIDIAN HM 0711238 DIAMOND RIDGE ESTATES SUB LOT 13 A PORTION THEREOF
17307059	0.130	T 6S R 13W SEC 7 SEWARD MERIDIAN HM 0711238 DIAMOND RIDGE ESTATES SUB LOT 13 A PORTION THEREOF
17307062	7.350	T 6S R 13W SEC 7 SEWARD MERIDIAN HM 0711238 DIAMOND RIDGE ESTATES SUB LOT 1 PORTION THEREOF
17307064	6.940	T 6S R 13W SEC 7 SEWARD MERIDIAN HM 0711238 DIAMOND RIDGE ESTATES SUB LOT 2 PORTION THEREOF
17305301	30.000	T 6S R 13W SEC 8 SEWARD MERIDIAN HM N1/2 N1/2 NW1/4 NW1/4 & N1/2 NE1/4 NW1/4
17305111	60.000	T 6S R 13W SEC 5 T 6S R 13W SEC 6 HM SEWARD MERIDIAN S1/2 S1/2 SE1/4 SW1/4 & S1/2 SW1/4 SW1/4 OF SEC 5 & S1/2 SE1/4 SE1/4 & S1/2 N1/2 SE1/4 SE1/4 OF SEC 6
17305236	10.000	T 6S R 13W SEC 5 SEWARD MERIDIAN HM SW1/4 SW1/4 SE1/4
17307060	4.600	T 6S R 13W SEC 7 SEWARD MERIDIAN HM 0711238 DIAMOND RIDGE ESTATES SUB LOT 14 THE W1/2 THEREOF

Finance Dept. Code:



Designated Use: Bridge Creek Watershed Property

Acquisition History: Ordinance 2003-7(A). Purchased from UAA.

Area: 220 acres

Parcel Number: 173 052 34, 35, 17305120

2015 Assessed Value: \$184,100

Legal Description: The Northwest one-quarter of the Southeast one-quarter (NW1/4 SE1/4) and the East one-half of the Southwest one-Quarter of the Southeast one-quarter (E1/2 SW1/4 SE1/4) and the Northwest one-quarter of the Southwest one-quarter of the Southeast one-quarter (NW1/4 SW1/4 SE1/4) and the Northeast one-quarter of the Southwest one-quarter (NE1/4 SW1/4) and the North one-half of the South one-half of the Southeast one-quarter of the Southwest one-quarter (N1/2 S 1/2 SE1/4 SW1/4) and the East one-half of the Southeast one-quarter (E1/2 SE1/4) of Section 5, Township 6 South, Range 13 West, Seward Meridian, in the Homer Recording District, State of Alaska.

Zoning: Bridge Creek Watershed Protection District. Not within City Limits.

Wetlands: Some wetlands. Bridge Creek flows through the property.

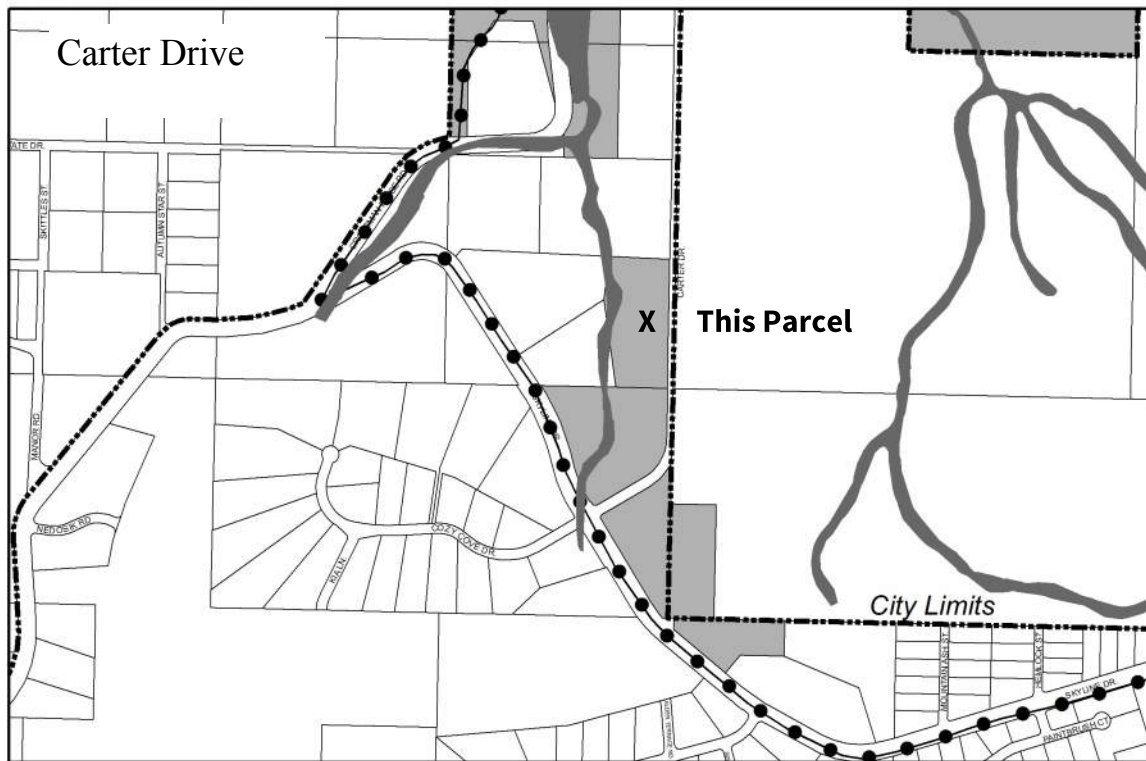
Infrastructure: None. Limited legal and physical access.

Notes:

Paid \$265,000 for land in 2003.

Fire hazard mitigation conducted in 2011.

Finance Dept. Code:



Designated Use: A public use to protect and enhance the City's Bridge Creek Watershed and thereby protect its water quality.

Acquisition History: Emergency Ordinance 2005-40, 2005-45.

Area: 5.93 acres

Parcel Number: 173070760

2015 Assessed Value: \$75,100 (Land \$44,300 Structure \$30,800)

Legal Description: HM0840119 T06S R13W S07 Pioneer Valley Subdivision Lot 2

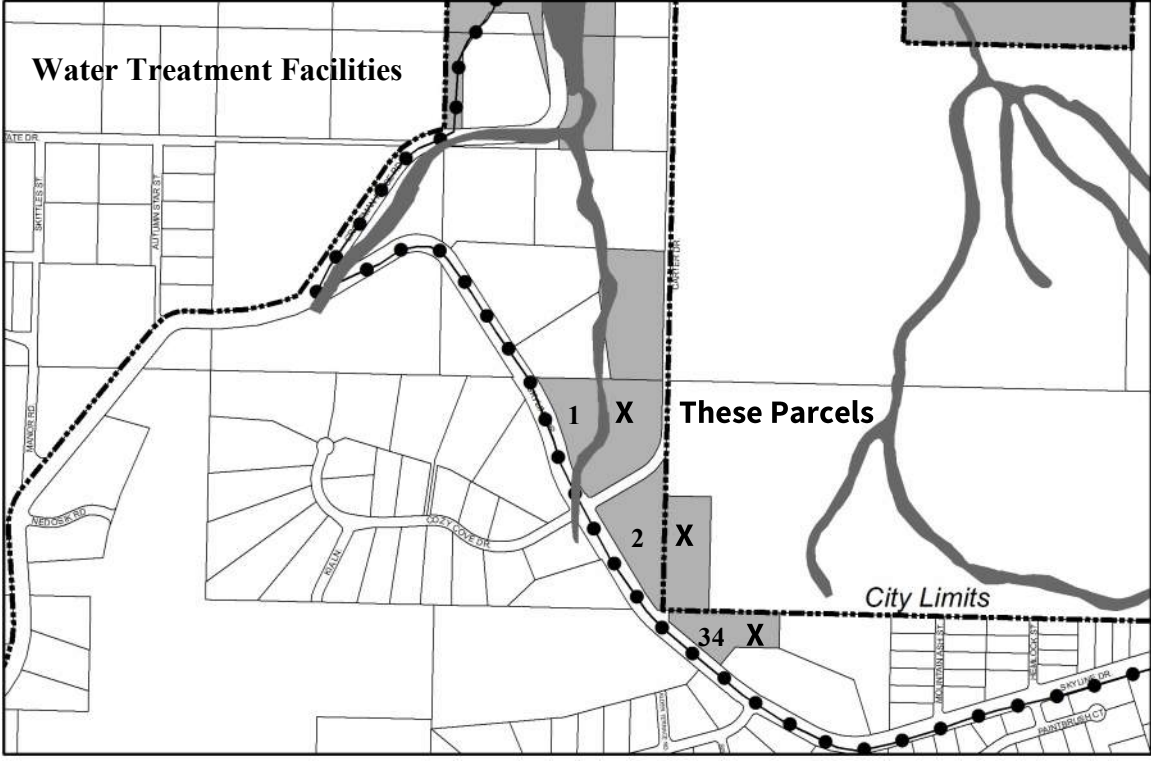
Zoning: Rural Residential, Bridge Creek WPD

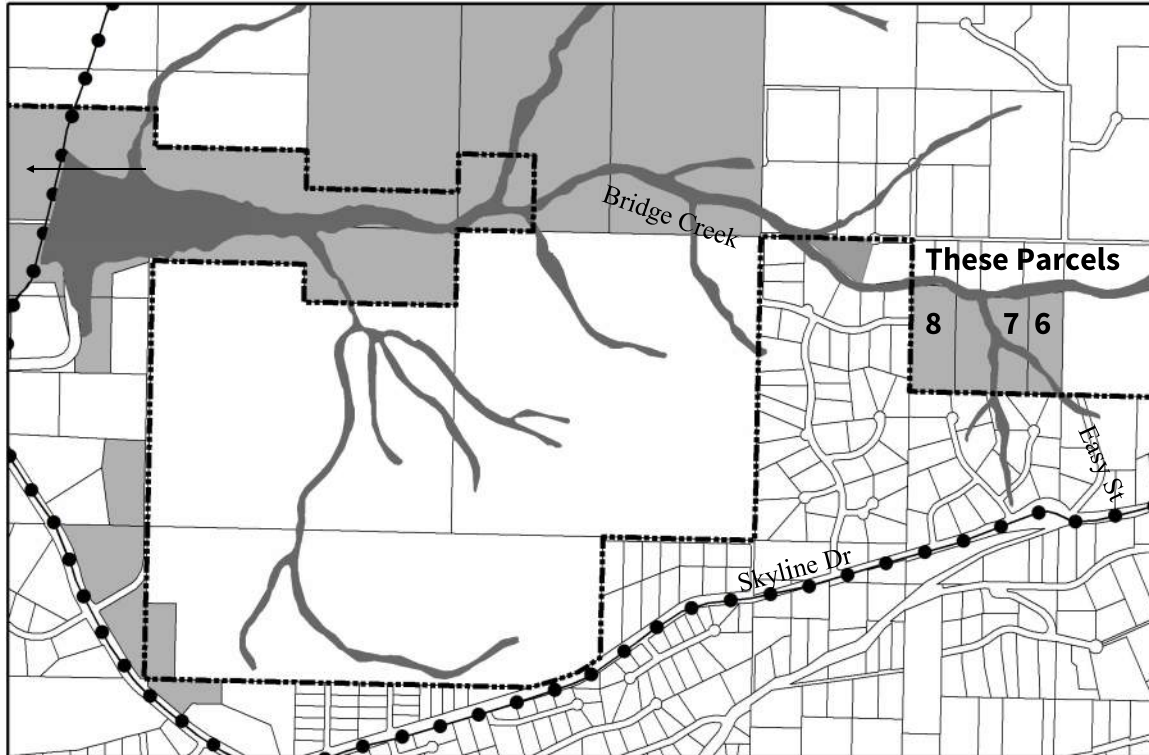
Wetlands: Some discharge slope wetland, possibly a creek to the Reservoir.

Infrastructure: Driveway access to property.

Notes: Property includes a small cabin.

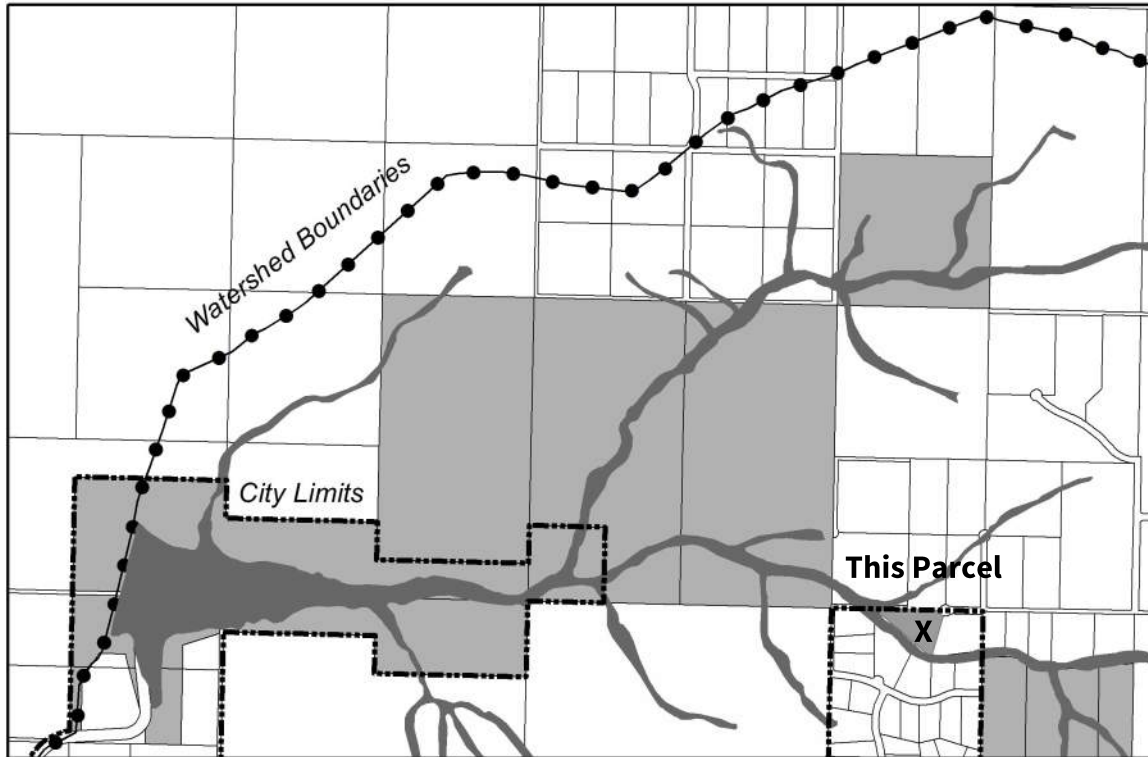
Finance Dept. Code:

	
Designated Use: Protecting the watershed and providing alternate access to property north of the City's water treatment plant, Water Tank and building, City Well Reserve Water Tank and building/Public Purpose. Acquisition History: Ordinance 10-21 (Lot 1) Lot 34 Purchased 1/97 Tulin	
Area: Lot 1: 7.83 acres Lot 2: 8.34 acres Lot 34: 3 acres	Parcel Number: 17307094, 95, 96, 17308034
2015 Assessed Value: Lot 1: land \$45,600 Lot 2: Land \$79,500, improvements \$3,343,300 Lot 34: land \$42,300, Improvements \$677,500,	
Legal Description: Hillstrand's Homestead Lots 1, 2, Tulin Terrace Upper Terrace Lot 34	
Zoning: Rural Residential, Bridge Creek WPD	Wetlands: Some discharge slope wetland, possibly a creek to the Reservoir.
Infrastructure: Paved road, electricity	
Notes: Bulk of Lot 1 purchased in 2010, Ord 10-21, \$90,000. 184 Skyline Dr Former water treatment plant site. A fire station/equipment storage was constructed in 2014. Eastern half of lot 2, acquired through eminent domain. Location of the water treatment plant. Lot 34 is the site of a 1 million gallon water tank.	
Finance Dept. Code:	



Designated Use: Watershed Protection Purposes Acquisition History: Ordinance 2009-08(A)	
Area: Lot 6: 6.91 acres, Lot 7: 13.38 acres Lot 8: 8.89 acres Total: 28.81 acres	Parcel Numbers: 1736600 6, 7, 8
2015 Assessed Value: \$185,700 (all lots)	
Legal Description: Lots 6,7 and 8, Roehl Parcels Record of Survey Amended	
Zoning: Not in city limits.	Wetlands: about half the land is wetland. Bridge Creek is the northern boundary of these lots.
Infrastructure: Gravel access on Easy Street and Quinalt Ave. There is a gravel road with some sort of easement over lots 6 and 7.	
Notes: Lots purchased 2/25/09 Lot 6, \$58,735, recorded document 2009-000612-0 Lot 7, \$113,730, recorded document 2009-000613-0 Lot 8, \$75,565, recorded document 2009-000611-0 Total Cost: \$248,030 The northern lot line of these lots is bridge creek, and meanders as the creek meanders.	
Finance Dept. Code:	

The map displays a network of roads and a creek. A dashed line indicates the 'City Limits'. A line with dots represents the 'Watershed Boundaries'. A specific parcel is highlighted in gray and labeled 'This Parcel X'. The creek, Bridge Creek, flows through the area, with some sections shaded to indicate wetlands.	
Designated Use: Public Purpose, Watershed Protection Purposes (Reso 16-043 Ord 16-19) Acquisition History: Tax foreclosure from KPB, Ordinance 15-15,	
Area: 40 acres	Parcel Numbers: 17305219
2015 Assessed Value: \$47,200	
Legal Description: T 6S R 13W SEC 4 SEWARD MERIDIAN HM SW1/4 NW1/4	
Zoning: Not in city limits, part of the Bridge Creek WPD.	Wetlands: about half the land is wetland. Bridge Creek is the northern boundary of these lots.
Infrastructure: Gravel access on Easy Street and Quinalt Ave. There is a gravel road with some sort of easement over lots 6 and 7.	
Notes: Purchase cost: \$2,805.21 in 2015. Legal and physical access to this property is difficult. Bridge Creek flows through a ravine along the bottom third of the lot, and the property is generally steep.	
Finance Dept. Code:	



Designated Use: Watershed Protection Purposes (Ord 17-27)

Acquisition History: City purchased from private land owner

Area: 2.86 acres

Parcel Number: 17305408

2017 Assessed Value: \$45,200 (high)

Legal Description: T 6S R 13W SEC 9 SM Kelly Ranch Estates Sub Lot 8 Block 1

Zoning: RR, and part of the Bridge Creek WPD.

Wetlands: Lot is all wetlands. Bridge Creek runs thorough the valley on the south side of the lot.

Infrastructure: Access by foot or ATV via a section line and undeveloped right of way.

Notes:

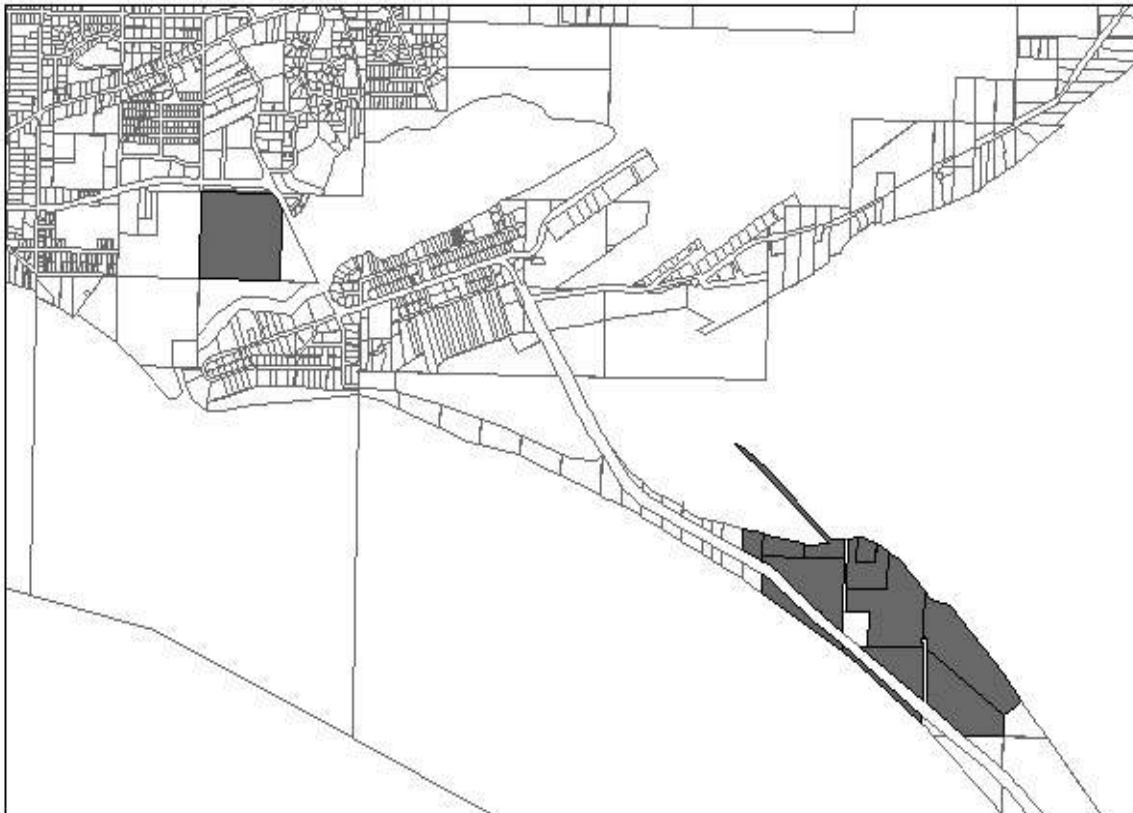
Purchase cost: \$21,000 in 2017.

Finance Dept. Code:

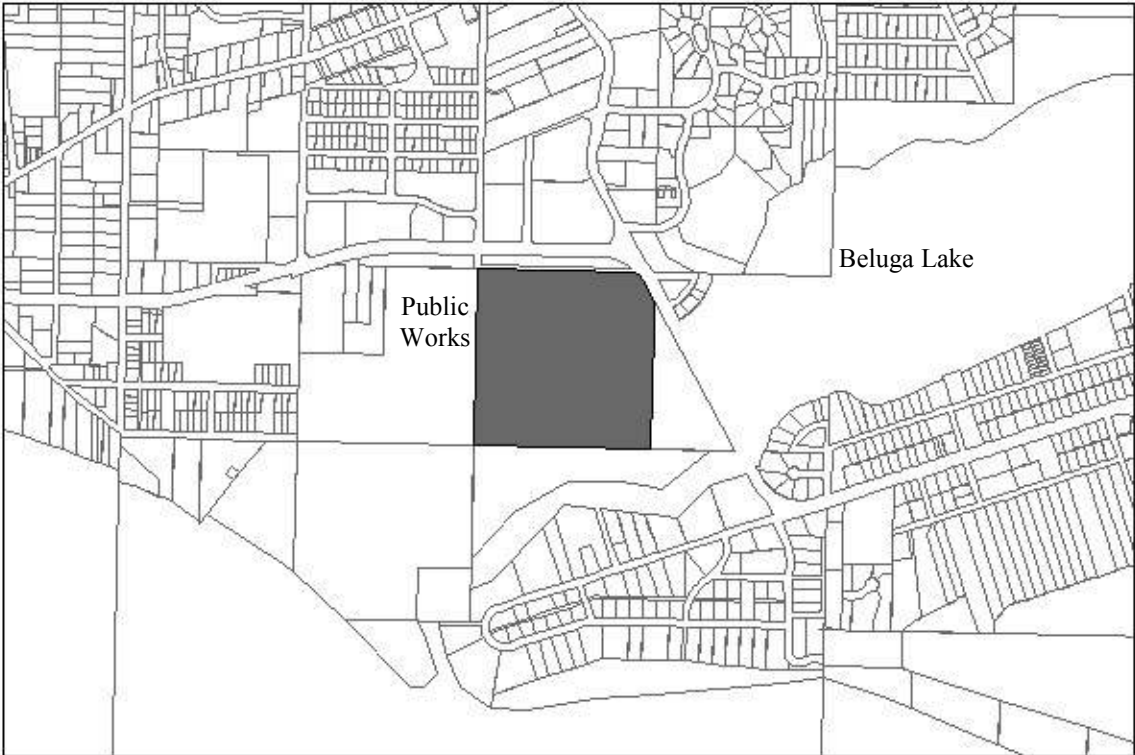
Homer Conservation Easement Lands

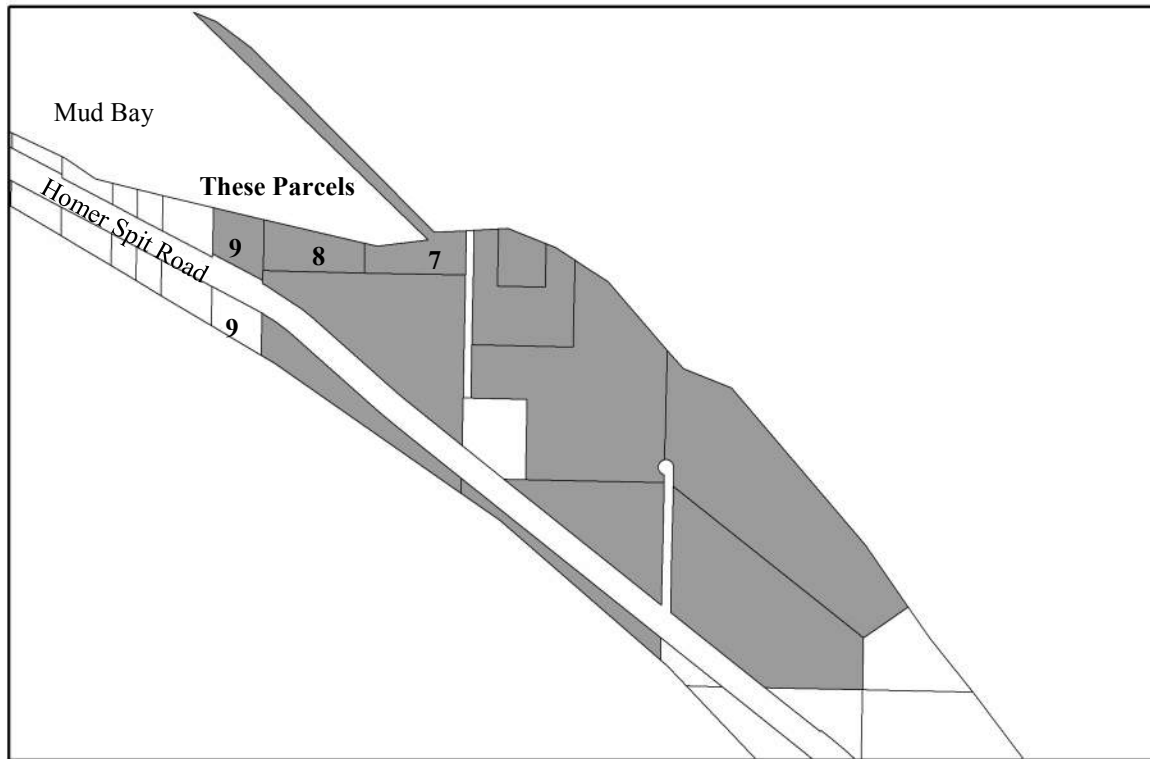
Existing conservation lands in Homer were mainly acquired through Exxon Valdez Oil Spill funding. Generally there are very strict easements on these lands as they were purchased to protect habitat, particularly shorebird habitat in sensitive areas. A portion of Louie's Lagoon has a conservation easement held by the Kachemak Heritage Land Trust.

Total acreage: 169.72 acres.



This section updated 11/20/2017

	
Designated Use: Acquisition History: EVOS purchase and conservation easement.	
Area: 39.24 acres	Parcel Number: 17714006
2017 Assessed Value: \$9,900	
Legal Description: HM T06S R13W S20 NW1/4 SE1/4 EXC HOMER BY PASS RD	
Zoning: Conservation	Wetlands: Beluga Slough Estuary
Notes: • Conservation Easement document recorded in Book 0275, Page 243, Homer Recording District, 4/21/98. • Parcel is within a FEMA-mapped floodplain. • Resolution 15-064 supported the inclusion of this land in the Western Hemisphere Shorebird Reserve Network	
Finance Dept. Code: 392.0013	

**Designated Use:**

Acquisition History: EVOS purchase and conservation easement. Resolution 97-72 and 104.

Area: Lot 7: 7.1 acres
 Lot 8: 3.94 acres
 Lot 9: 3.00 acres
 Lot 9 S of Road: 2.16 acres (no EVOS
 Conservation Easement)

Parcel Number: 181020 02, 01, 18101023, 24

2017 Assessed Value: Lot 7: \$6,800 Lot 8: \$113,300 Lot 9: \$142,400 Lot 9S: \$4,100

Legal Description: HM T06S R13W S27 GOVT LOT 7 (east) and 8 (west)
 HM T06S R13W S28 THAT PORTION OF GOVT LOT 9 LYING NORTH OF HOMER SPIT RD

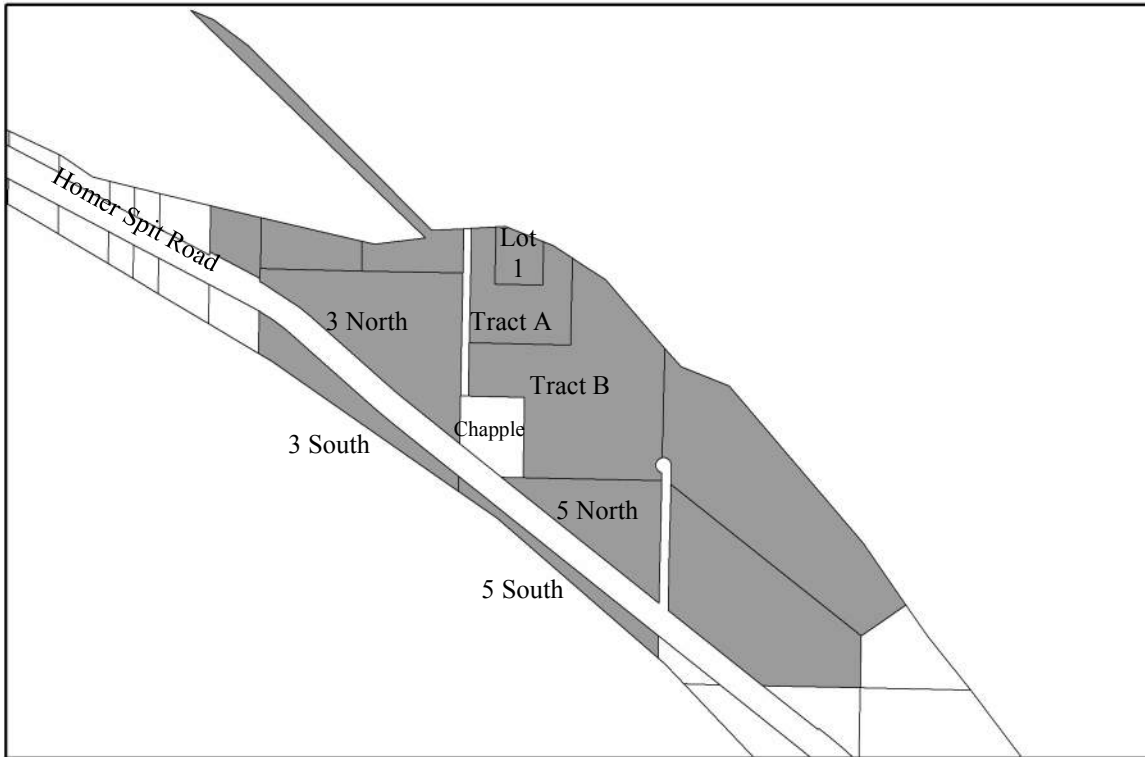
Zoning: Conservation—lots 7 and 8
 Open Space Recreation—Lot 9

Environment: State Critical Habitat Area below
 17.4 ft . mean high tide line.

Notes:

- Conservation easement recorded in Book 0275, Page 229, Homer Recording District, 4/21/98.
- Parcels are within a FEMA-mapped flood hazard area.

Finance Dept. Code:

**Designated Use:**

Acquisition History: EVOS purchase and conservation easement.

Area: Total: 70.97 acres

Parcel Number: 18102 03, 04, 05, 06, 09, 10, 14

2017 Assessed Value: Total: \$281,800

Legal Description: T 6S R 13W SEC 27 SEWARD MERIDIAN HM:

- 0630660 WALTER DUFOUR SUB LOT 1, 0630060 WALTER DUFOUR SUB TRACT A
- THAT PORTION OF GOVT LOT 3 LYING NORTH OF HOMER SPIT RD
- THAT PORTION OF GOVT LOT 3 LYING SOUTH OF HOMER SPIT RD
- THAT PORTION OF GOVT LOT 5 LYING NORTH OF HOMER SPIT RD
- PORTION OF GOVT LOT 5 LYING SOUTH OF HOMER SPIT HWY
- 0770055 WALTER DUFOUR SUB TRACT B TRACT B

Zoning: Conservation

South side of lot 5 is zoned Marine Industrial, but development is restricted by the conservation easement.

Environment: State Critical Habitat Area below 17.4 ft. mean high tide line.

Notes:

- Conservation easement recorded in Book 0275, Page 222, Homer Recording District ,4/21/98.
- Deeded to the City on same date, Book 0275, Page 236, HRD.
- Parcels are within a FEMA-mapped flood hazard area.

Finance Dept. Code:

**Designated Use:**

Acquisition History: EVOS purchase and conservation easement.

Area: Total: 45.47 acres

Parcel Number: 181-020 - 18, 19

2017 Assessed Value: Total: \$207,500

Legal Description: HM2001008 T06S R13W S27 LOUIE'S LAGOON LOT 6-A
HM2001008 T06S R13W S27 LOUIE'S LAGOON LOT 6-B

Zoning: Conservation

Environment: State Critical Habitat Area below
17.4 ft. mean high tide line.

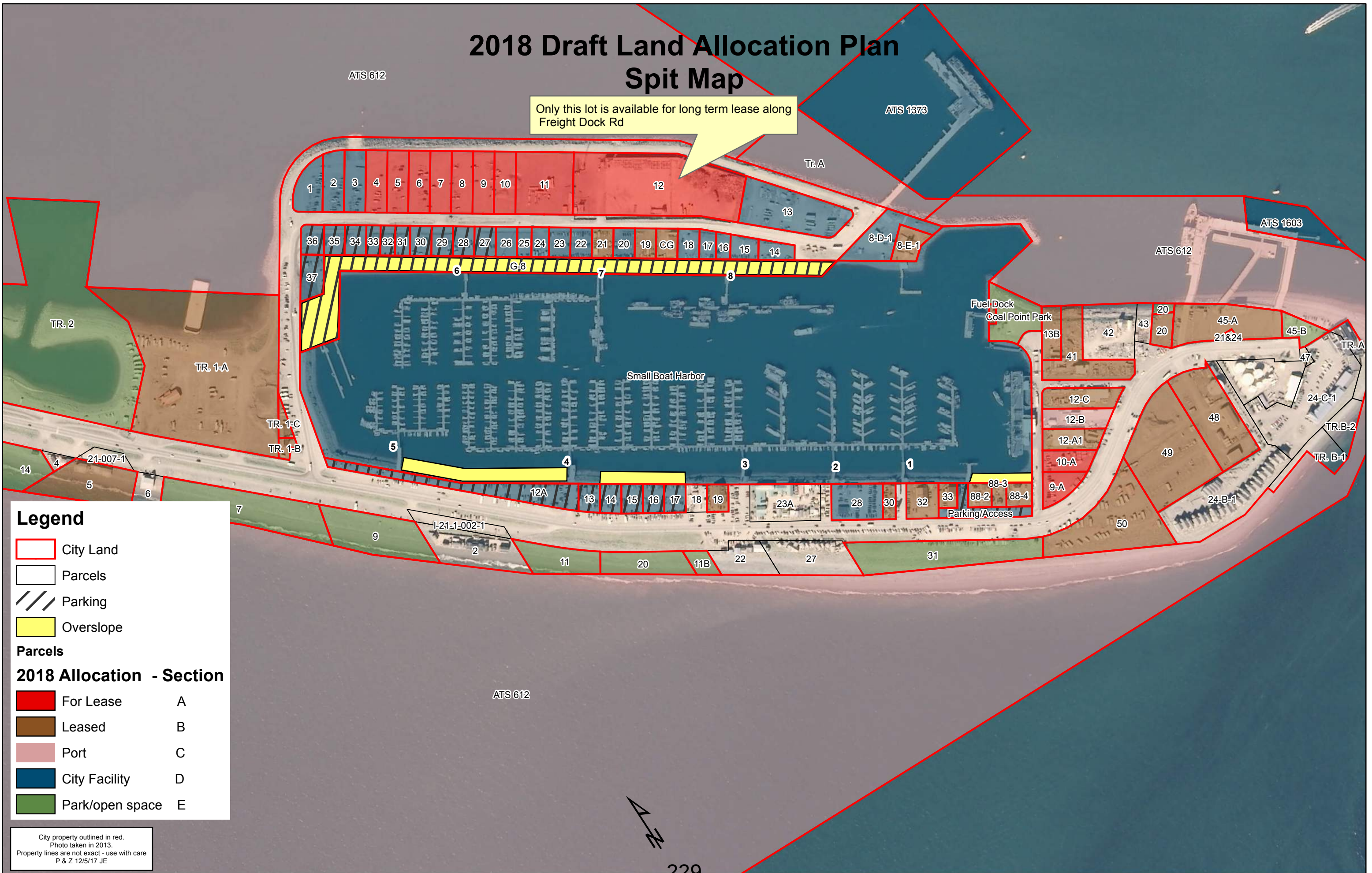
Notes:

- Conservation easement recorded in Book 0275, Page 229, Homer Recording District, 4/21/98. This easement covers former Lot 6. See plat 2001-008.
- Conservation easement with Kachemak Heritage Land Trust on Lot 6B. Executed 10/4/02, document 2004-004843-0 HRD.
- Parcels are within a FEMA-mapped flood hazard area.

Finance Dept. Code:

2018 Draft Land Allocation Plan Spit Map

Only this lot is available for long term lease along Freight Dock Rd



Legend

- City Land
- Parcels
- Parking
- Overslope

Parcels

2018 Allocation - Section

- | | |
|---|---|
| For Lease | A |
| Leased | B |
| Port | C |
| City Facility | D |
| Park/open space | E |

City property outlined in red.
Photo taken in 2013.
Property lines are not exact - use with care
P & Z 12/5/17 JE





City of Homer

www.cityofhomer-ak.gov

Office of the City Manager

491 East Pioneer Avenue
Homer, Alaska 99603

citymanager@cityofhomer-ak.gov

(p) 907-235-8121 x2222

(f) 907-235-3148

Memorandum

TO: Mayor Zak and Homer City Council
FROM: Katie Koester, City Manger
DATE: December 6, 2017
SUBJECT: City Manager's Report for December 11th, 2017

Subdivision Agreement with Quiet Creek Subdivision

The Planning Commission approved a final plat for the proposed development of Quiet Creek Subdivision which has allowed Public Works to move forward with a Construction Agreement with the developer, Echo Trading Company for the construction of all required road, drainage, water, sewer and non-City owned utilities. The developer has agreed to extend water and sewer and construct the road through Ronda Street off of East End and part of Nelson Avenue. This will benefit 6 properties and create a water and sewer main loop to connect with the East End main. This is beneficial to the City as dead end water mains require more maintenance, flushing and the homes are more vulnerable to service interruption. Another benefit is City funds will not be used to create a SAD for these improvements. The developer will work independently with the property owners to share in the cost of extending the services. However, a property owner has every right not to participate. HCC 11.30 (for road) and 14.30 (for water and sewer) provides a mechanism for the developer to be reimbursed for the initial investment (minus a 15% administrative fee for the City) should that property owner hook up to water and sewer or request a driveway permit to access the road in the future. The payment plan for those property owners who choose to defer to a later date requires Council approval. After construction is complete, the developer is required to submit an affidavit from each property owner that did not participate in the cost sharing through the initial construction and costs associated with installing the infrastructure. From that, Council will determine final terms and conditions. Echo trading Company is expecting to complete construction in 2018, which means it could come before Council as early as the end of 2018.

Industry Forum

The Kenai Peninsula Economic Development District is hosting the 2018 Industry Outlook Forum January 10th at the Soldotna Regional Sports Complex. The Forum is free and open to the public but you have to register by January 5th <https://kpedd.org/2018-industry-outlook-forum/> The Forum is an opportunity to hear updates from a Peninsula perspective on oil and gas, mining, education, tourism, fishing, agriculture, the medical industry, non-profits and local entrepreneurs (agenda attached).

Fire Hall Project Completion Report

A report on the Fire Hall project is attached. Good news – the project came in almost \$100,000 under budget. In addition to excellent local project management, Public Works Director Meyer jumped in whenever he could to keep costs down. The only remaining item on the todo list is the 1% for the arts. We will likely combined this with an upcoming project, issue an RFP and solicit PARAC guidance on the public art component.

Investment Recommendations from Finance Department

In an attempt to get maximum utility out of our dollars, the Finance Director will be moving \$4.5 million of liquid funds in the Alaska Municipal League Investment Pool (AMLIP) account to short and medium term bonds, consistent with the City of Homer investment policy. Finance has done a cash flow analysis and determined we need to keep a minimum of \$4million in the AMLIP account to cover cash flow, payroll and projects. In addition the Finance Department will be consolidating the City's two primary investment accounts with one firm. The bonds the City holds will remain the same, however consolidation will allow us to keep a much better handle on making sure the schedule for the maturity of the bonds is consistent with anticipated upcoming expenditures and that we don't hold more than the FDIC insured amount in any one investment. See memo from the Finance Director for more details.

Enc:

Employee Anniversaries

Fire Hall Project Completion Report

Industry Forum Agenda

Memo from Finance Director on Investments