CHAPTER 6: MITIGATION

As described in Chapter 4, the approach taken in the Anchorage Wetlands Management Plan has been to allow for some development to occur, while retaining or avoiding the most critical wetland areas. A balance can be achieved between developing wetlands with a subsequent loss of function and preserving wetlands in a city with limited land available for development. Although wetlands for which development is recommended are generally those with limited wetland values, the proposed development should incorporate mitigating measures to minimize the degradation or loss of wetland values and functions to the maximum extent practicable. It should be clearly recognized that, whether and if, these mitigation techniques can be applied will depend on the adoption of land management techniques providing increased site design flexibility and changes to current municipal site review procedures. Please note that the Corps of Engineers guides mitigation under the Clean Water Act, Section 404 permit process.

The Mitigation sequence is defined as the following:

1. ***Avoid:*** *Avoiding the adverse impacts altogether by not taking a certain action;*
2. ***Minimize****: Minimizing impacts by limiting the degree or magnitude of the action;*
3. ***Compensation:*** *Compensating for the impact by replacing or providing substitute resources or environments through:*
   a. *Rectifying the impact by repairing, rehabilitating or* ***restoring*** *the affected environment;*
   b. ***Create*** *or establish new wetlands where they did not exist before;*
   c. ***Enhancement*** *of existing degraded wetlands improving one or more of their functions.*
   d. ***Preservation*** *of wetlands in perpetuity using a conservation easement or other mechanism.*
      i. ***Mitigation Banking*** *allows developers who will incur wetland impacts to compensate by purchasing credits from a wetland mitigation bank prior to filling wetlands. Mitigation Banks basically preserve wetlands and sell the credits for a fee established by the bank.*
      ii. ***In-lieu-fee mitigation*** *allows payment of a set fee to compensate for wetland impacts assessed by the Anchorage Debit-Credit Methodology or other method accepted by the Corps of Engineers. Fees are used by authorized entities to purchase wetlands to be preserved or to enhance or restore existing wetlands.*

I. DESCRIPTION OF POTENTIAL MITIGATION MEASURES

In order to determine which mitigating measures are likely to be most effective and economic, the type and extent of impacts must be understood. Although each development proposal must be examined in relation to the wetland and wetland resources potentially affected, it is useful to consider the impacts which are typically associated with the more common development activities.

It is possible to define certain general classes of mitigation techniques according to the three phases of development: planning and design; construction; and operation. In all cases, specific wetland development plans and initiation measures must be approved by the Municipality and/or the Corps of Engineers or other federal and state permitting agencies prior to applying for plats and initiating site preparation and construction.

Actual on-site mitigation measures may include some of the following descriptive mitigation methods or some combination of these and other methods. **Table 6** should be referred to for a more definitive listing of mitigation techniques relative to Anchorage wetlands.

A. PLANNING AND DESIGN

The best, and essentially the only, time to develop effective and economical wetlands mitigation measures is during initial project planning and conceptual design. It cannot be emphasized too strongly that the effectiveness of this plan and its associated mitigation techniques will greatly depend upon an adequate development review process and the capability of including mitigation measures in project development plans. Revising a plan after it has been finalized is not only costly, but it is less likely to be effective in protecting the wetland values. Major mitigation measures for typical wetland developments in Anchorage are discussed in **Table 6**.

B. SITE SELECTION

In the past, development sites have often been selected without regard for the wetland values which may be impacted. With growing awareness of the importance of wetlands and knowledge of the costs of construction and facility installation in these areas, development in wetlands is expected to become much more selective. Increasingly, development should occur in areas of less critical wetlands, with the most important hydraulic and habitat regions being protected.

C. SIZE OF DEVELOPMENT

All other considerations being equal, the loss of wetland values is a direct function of the size of development. In the Anchorage Wetlands Management Plan, critical areas are given a protected status, with development being allowed to proceed in other areas under the "C" designation. Nonetheless, certain of the large "C" areas may contain pockets of higher functioning or valued wetlands that should, to the extent practicable, be avoided in the construction of the project. A major incentive for avoiding development within higher valued wetland sites is the cost of mitigation measures. Where feasible, information from prior wetland assessments and from various resource agencies should be evaluated prior to final project sizing.

D. BUFFER ZONES

The interface between the wetland and the surrounding uplands is the most critical impact zone. If these wetland edges can be protected from significant disturbance, loss of wetland values can be minimized. One means of achieving this protection is by providing a buffer zone, such as a greenbelt or vegetative screen, between the wetland and the development. Using a conservation subdivision technique, by clustering homesites and providing a community greenbelt, the maximum housing density can be achieved with minimum impacts.

Table 6

MITIGATION MEASURES

1 = Primary mitigation measure, 2 = Secondary mitigation measure

Activity	Mitigation Measures	Wetland Type		
		"A"	"B"	"C"
Planning	Roads, Utility Lines			
	Delete from long range plan	1	1	2
	Restrict hook-ups		1	2
	Use common corridors		1	1
	Housing			
	Trade density for open space		1	1
	Retain wetlands and watercourses/waterbodies		1	1
	Land Exchange			
	Encourage land trades	1	2	1
	Restoration			
	Restore valuable wetlands	1	2	2
Design	Site Design			
	Cluster building		1	1
	Creek, lake and wetland setbacks		1	1
	Minimize paved areas		1	1
	Facility Design			
	Pilings for foundations		2	1
	Minimize structure pad size		2	1
	Impervious barriers in trenches		1	1
	Avoid perforated storm drains		1	1
	Decrease road right-of-way		1	1
	Use pervious pavement		2	1
	Use filter fabric, porous pad material		2	1
	Consider elevated causeways		1	1
	Use multiple culverts		1	1
	Replace lost wetland functions		1	1
	Avoid stream re-channelization		1	1
Construction	Surcharging		2	1
	Avoid Critical Wildlife Cycles		1	1
	Proper Disposal of Debris		1	1
	Minimize Ground Cover Disturbance		2	1
	Consider Winter Construction		1	1
	Avoid Fill in Creeks and Lakes		1	1

The mitigation measures recommended in **Table 6** are to be used as guidelines, not as requirements. **Table 6** is to be viewed as a checklist of techniques which reduce the impacts of development on wetlands. It can

be used as an aid in evaluating future site-specific proposals. “D” and “P” designated wetlands are subject to mitigation measures per Corps of Engineers permitting guidelines based on information presented from wetland delineations and other sources as required by the reviewing federal and/or state agencies.

E. MINIMIZE FILL

The most serious impacts to wetlands are caused by excavation and filling. Excavating wetlands may change flow or circulation patterns as well as bottom elevations. The release of sediments during excavation may also cause physical and chemical changes, such as reduced light transmission, smothering of bottom organisms, and alteration of substrate composition. Pollutants associated with sediments may be released by excavation, and pH and dissolved oxygen levels may be adversely affected.

Placement of fill into a wetland not only destroys the existing resource in the area filled, but it may also have far reaching effects on adjacent areas. Placement of fill may impair natural circulation and flow patterns and be a source of sediment that alters bottom substrate, reduces light transmission, and smothers or damages aquatic organisms. If the fill is dredge spoil or industrial waste, with a fine particle size or high organic or toxic contents, these may create additional water quality problems. Alternatives to filling wetlands, such as the use of pilings, should be addressed before final development plans are prepared.

If excavation is necessary, sediments suspended by dredging should be contained to the maximum extent possible. This can be accomplished by surrounding excavation locations with a silt fence/curtain or similar device. Another effective method is "dry" dredging; i.e., leaving a dike or earth plug between open water and the excavated area.

If filling is necessary, fill should not be placed in main channels of watercourses or within water bodies. As necessary, fill should be contained to prevent siltation and transport back to the watercourses or water bodies. This can be accomplished by surrounding the fill area with coir logs, silt fences or similar containment device. If the filled area is large or could affect area hydrology, provide open channels, culverts, or permeable areas to allow for continued water circulation. In all cases, fill areas subject to erosion should be protected by planting vegetation, applying filter-fabric blankets, or using similar erosion control technology.

F. MINIMIZE DRAINAGE

A wetland without water is no longer a wetland. Drainage and water diversion change the habitat and composition of vegetation and wildlife. These activities result in lowered water tables that also affect adjacent areas. In many cases, wetlands have been shown to purify incoming water by removing sediments and nutrients. Diversion of water may result in water quality problems (usually eutrophication) for the lakes or streams which previously received water "purified" by the wetland.

As a general policy, drainage and water diversion should be avoided within a wetland that is intended for development. Drainage of an area that is hydrologically linked with, or in close proximity to, other wetland areas should be avoided unless the entire wetland area is to be developed. Diverted water should, in general, not be directed into receiving waters unless retention structures and water quality control devices are used prior to discharge.

G. MINIMIZE CHANNELIZATION

Channelization is potentially very damaging to wetland areas. It may result in increased erosion, the lowering of local water tables, and increased peak runoff flows, as well as increased flooding. It may also

cause the transfer of water to downstream watercourses or water bodies without the benefit of purification that often occurs when water has passed through a wetland area. Channelization also results in the production of dredge spoil which may lead to disposal problems.

As a general policy, channelization should not be considered except in extreme cases where all alternative practices have been rejected. Channelization should be restricted to existing stream channels or to existing drainage ditches. Construction of blind channels and finger-fill development, which often cause adverse circulation and water quality impacts, should be avoided. If an existing channel is to be widened, only one side should be enlarged. Vegetation which shades a stream should be retained or replanted. Culverts should be installed in such a way as to not create a barrier to aquatic life. The use of bottomless or arched culverts with natural rock substrate is an example of an optimal design.

H. MINIMIZE SITE CLEARING AND GRADING

Clearing and grading will not only destroy the wetland habitat, but may also have adverse effects on surrounding areas through erosion of sediments and destruction of drainage and flow patterns. As a general policy, the time and extent of exposed soil should be minimized and existing drainage patterns should be retained. Soil should not be pushed onto stream banks or onto areas where it will be transported into the water course. Where feasible, tracked-wheel equipment should be used rather than wheeled vehicles to reduce the impact upon soils. Runoff should be diverted around the exposed area until it is stabilized. Temporary sediment barriers should be utilized to reduce runoff velocities and entrap suspended sediments. Vegetation should be retained along the edge of the wetland.

I. CONSTRUCTION SCHEDULING

Although construction impacts are generally short term, they are often very intense and, consequently, may produce lasting changes in the wetlands environment. Measures to mitigate impacts through scheduling of construction activities include:

Avoiding Critical Periods for Fish and Wildlife Populations:
Critical fish and wildlife periods generally include mating and reproduction activities. Such activities vary in kind and intensity from wetland to wetland, therefore site-specific information is needed. Updated information can be obtained from staff with the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, as well as the Municipality of Anchorage's Community Development Department, Corps of Engineers and EPA. The General Permits are conditioned that no fill activity can occur between April 15 and July 15 to protect nesting and migratory birds.

J. POST-CONSTRUCTION ACTIVITIES

Long-term effects of development in wetlands result from the conversion of wetlands to uplands after construction. It is important that developments and fill activities within wetlands including any structures, i.e. stormwater, continue to be maintained to prevent impacts to adjacent wetlands, watercourses or water bodies. In general, a developer must demonstrate a commitment to protecting values of the remaining wetland even after the facility is built and in operation. Some of the means to mitigate the long-term operational impacts of these developments are as follows:

1. Maintain All Mitigative Design Measures

If culverts are included in a fill design, it is necessary that they be inspected routinely to prevent clogging and retardation of flow. Oil/grit separators and other mechanical water quality devices should be maintained and cleaned out regularly. If greenbelts or vegetative screens are

established, they must be maintained so that heavy use does not result in adverse impacts to water quality or wildlife habitat. Maintenance practices such as snow removal from bridges could be mitigated by varying snowplowing techniques to reduce impacts of contaminated snow melt within watercourses. In general, a developer must demonstrate a commitment to protecting wetland values even after the facility is built and in operation.

2. Restore or Rehabilitate Lost Resources

In certain cases, loss of a wetland value may be an inevitable result of development. However, such a loss may be acceptable as long as the loss of wetland functions and values are mitigated. Because the possibilities for wetland restoration and rehabilitation are numerous, depending on the value lost and the approach taken, this should be a discussion between the Municipality, permitting agencies and the developer on a case-by-case basis.

II. RELATIONSHIP OF MITIGATION MEASURES TO PLAN DESIGNATIONS

There is an intended, direct relationship between the wetland designations given in this Plan and the associated mitigation measures. Particular uses are associated with the various plan designations, and correspond to limited activities and uses within the "A" wetland environment and to fairly extensive permitted uses in "C" wetland zones. The intent of the "A" designation is to protect the natural features of the wetland by leaving it in a natural state. Full development, consistent with zoning use categories and the use categories of the comprehensive plan, is anticipated within "C" wetland areas as long as mitigation measures and proper engineering practices are utilized.

It should be stressed that the mitigation techniques identified here are generalized methods. It is intended that both developers and reviewing agencies will use these techniques as a checklist in the project plan review process.

It is further intended that the developer is to be provided flexibility in the type of mitigation techniques to be used in project design and construction. Depending on the type of wetland, severity of impact, and cost or feasibility of technique, any one or combination of techniques may be selected. In this sense, the concept to be applied in project review is that of performance criteria. The developer is to be allowed flexibility in design, but must demonstrate an adequate incorporation of available, feasible mitigation measures in the planning, design, construction and post-construction aspects of project development. The plat and regulatory review processes are expected to ensure the satisfactory consideration and incorporation of these mitigation features.

It must be reiterated that the effective use of mitigation measures in a systematic and comprehensive manner will depend greatly on changes to the Municipality's land control ordinances, as described earlier in this Chapter. Under the auspices of the EPA, the Corps of Engineers is the final authority in determining appropriate mitigation for any regulated activity.

III. MITIGATION RECOMMENDATIONS

A. USE OF MITIGATION MEASURES

The intent of the Anchorage Wetlands Management Plan is to identify and designate Anchorage wetlands by type, according to their relative functions and values. Critical wetland areas performing significant habitat, water quality, or other functions have been designated "A" for protection. Those of less critical value are classified either "B" or "C" and it is these wetlands, since they are intended to be impacted by development, that the mitigation techniques are to be applied.

It is important to recognize that the use of mitigation techniques, while applicable to all "C" wetlands, is especially critical within areas designed as "B" wetlands and in certain large undisturbed wetland tracts, e.g., portions of Connor's Bog and Campbell/Klatt Bog. These areas have important, associated open space and wildlife values due to their size and relative isolation. Major portions of these wetlands should be reserved in their natural state or protected through the use of mitigation measures that allow the important wetland values to be retained.

In wetlands classified as "C," techniques generally will be limited to those mitigating the major impacts of development. It must also be recognized that the use of these techniques may require the amendment of current municipal codes and regulations, especially those related to the review and approval of zoning ordinances and subdivision plats or variances to municipal code. Because "A" wetlands are to be retained in their original state, the use of mitigation techniques is not as necessary. Such techniques should be carefully considered, however, for those wetlands designated "C" adjoining critical wetland areas.

The effective use of mitigation techniques will vary greatly, depending upon major changes in current municipal review procedures and land use ordinances. Currently, the site plan review process of development proposals within wetlands does not require a thorough consideration of mitigation measures. Accordingly, each of the following processes must be established or amended in order to ensure the use of mitigation techniques.

B. PLAT PRE-APPLICATION CONFERENCE

Representatives of the Corps of Engineers and other resource agencies are included in the pre-application plat review process administered by the Municipality. This review process is conducted for the majority of development proposals in uplands as well as within wetlands. For development in wetlands, the platting process requires, as a condition of plat approval, the issuance of a fill permit from the Corps of Engineers. However, in current practice, the design aspects of the subdivision plat are generally approved prior to Corps of Engineers review and action, thus minimizing any effective inclusion of mitigation measures. Developers are encouraged to seek Corps of Engineers permits and authorizations prior to submitting for municipal plats and other approvals.

C. SUBDIVISION ORDINANCE AMENDMENT

The existing subdivision ordinance (AMC 21.85) does not require the inclusion of mitigation measures as a feature of subdivision design. It is important to have a process that will enable the developer to tailor mitigation technique(s) to specific characteristics of the topography and environmental functions of a particular site, thereby allowing flexibility in site design and the types of engineering measures to be applied. The provisionally adopted, Anchorage Municipal Code, Title 21 assisted in remedying existing code

by creating a conservation subdivision under 21.08.070, which allows developers a means to create denser development on uplands while avoiding higher valued wetlands.

D. ZONING ORDINANCE AMENDMENT

Many mitigation techniques identified here cannot be effectively applied under the current zoning district procedures. For example, front, back and side yard setbacks; lot coverage; and density level requirements within each zoning category effectively preclude any of the "clustering" techniques described in Chapter 4. To utilize mitigation measures, which require the avoidance of critical land areas and the minimization of site clearing and grading, zoning ordinance changes allowing the clustering of structures have been implemented. These techniques, and the Planned Unit Development standards, allow development to take place at specific, limited areas on the site, actually in a concentrated pattern, and usually to the underlying densities of the district use zone. The Provisionally Adopted Code addresses the Planned Unit Development in 21.03.080F. and has included another technique, Conservation Subdivisions.

IV. MITIGATION BANKING AND IN-LIEU-FEE PROGRAMS

Mitigation banking has developed into a widely accepted method of compensatory mitigation per EPA and Corps of Engineers regulations. The Municipality has seen the establishment of a private mitigation bank and in-lieu-fee program since the 1996 plan, with other programs in process of seeking establishment. Within South-central Alaska, other banks now exist in communities such as the Matanuska-Susitna valley. Mitigation banks preserve wetlands with ecological importance to the watershed while providing a means for developers to compensate for projects in less valuable wetlands.

A mitigation bank is a wetland, stream segment, or other aquatic resource area that has been restored, established, enhanced, or (in certain circumstances) preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 or a similar state or local wetland regulation. A mitigation bank may be created when a government agency, corporation, nonprofit organization, or other entity undertakes these activities under a formal agreement with a regulatory agency such as the Corps of Engineers.

The value of a bank is defined in "compensatory mitigation credits." A bank's instrument identifies the number of credits available for sale and requires the use of ecological assessment techniques to certify that those credits provide the required ecological functions (see "REV," Relative Ecological Value, under definitions, in Chapter 4). The EPA and Corps of Engineers, in conjunction with the Municipality, have developed a methodology to calculate credits and debits for use in mitigation banks and in-lieu-fee programs. The Anchorage Debit-Credit Methodology can be accessed at:

http://www.muni.org/Departments/OCPD/Planning/Physical/EnvPlanning/Pages/CreditDebitMethod.aspx

Mitigation banks are a form of "third-party" compensatory mitigation, in which the responsibility for compensatory mitigation implementation and success is assumed by a party other than the permitee. This transfer of liability has been a very attractive feature for Section 404 permit-holders, who would otherwise be responsible for the design, construction, monitoring, ecological success, and long-term protection of the site.

Under an In-Lieu-Fee program (ILF), a permitee can pay a set fee for compensatory mitigation in lieu of providing other types of mitigation. An ILF program provides predictability and helps streamline the permitting process for applicants. The Municipality's General Permits operate using a fee-in-lieu-of mitigation charge. It should be emphasized that a fee-in-lieu of mitigation is the last level of the federal mitigation sequence. It is not generally used unless other mitigation avenues are not possible or practicable to use.

V. SUMMARY

The use of mitigation techniques is generally confined to wetlands where lesser value portions may be more easily developed. Filling these wetlands accommodates the need for development and it is these areas for which mitigation is especially critical. The types of mitigation techniques vary widely, and generally affect the planning, design, construction, and post-construction aspects of a development project. The use of mitigation techniques is strongly encouraged and required under Section 404 guidelines. It is recognized that current review and land management requirements have adopted some of the initial mitigation ideas from previous wetlands plans. This Plan therefore recommends:

1. Continuation of a coordinated wetland review process; and
2. Inclusion of a design review process and design/construction requirements, as appropriate, in the Anchorage Municipal Code.

These changes would ensure the adequate consideration and use of wetland construction mitigation techniques.