



Airport Development Plan ***for the*** ***City of Merritt***



August 2003

INTRODUCTION

SECTION 1.0

1.1 General

This development plan has been prepared by Global Approach Services for Aviation for the City of Merritt to provide a framework for the development of Merritt Airport.

The Terms of Reference identifies the following goals and objectives for the Development Plan:

- Maximizes the available area as the total area available for development is relatively restricted.
- Provides a configuration of lots having groundside and/or airside access.
- Identifies need and provides cost estimates for additional improvements to existing services.
- Provides cohesion to and serves to anchor the area as a transportation/distribution center.
- Clearly identifies clearance restrictions on all lots based on desired future classification.

1.2 Background

The City of Merritt is a community of approximately 8,000 persons situated in the Nicola Valley about 270 km northeast of Vancouver. The valley supports agriculture, forestry and mining with a trading area population of nearly 15,000.

Merritt is strategically located at the intersection of north-south and east-west highway routes including:

Highway 5 Coquihalla to Kamloops and Vancouver
Highway 97C east to the Okanagan Valley
Highway 5A to Princeton
Highway 8 to Spences Bridge

City Council has a stated objective to promote the area as a Transportation Centre and to use its strategic location to create economic opportunity for the community.

Although the city is well served with road access, air transportation and inter-modal connection can play a significant role in meeting the needs of the population.

1.3 Existing Facilities

Merritt Airport is located within the municipal boundary of the City of Merritt and includes a site of approximately 30 ha. The current site was originally developed as an airport in 1971 and has been added to over the intervening years. The current facilities include:

Runway 1219m x 23m
Apron 61m x 91m
Parallel Taxiway 10.5m x 300m
Helicopter Landing Pad – Light Helicopters
Air Terminal Building

Recent developments on the adjacent private lands include the construction of Wagon West Travel Plaza (Husky Truck Stop) and proposed Motel 6 and Auto Mall. There is a relatively small area of land available for development on the airport, which makes it essential that it is developed to its greatest potential.

Adjacent private lands have frontage on the airport runway and may benefit from their ability to provide direct airside access. Restrictions to protect airspace around the airport will impact the adjacent lands regardless of the use selected by the landowners. Restrictions will primarily be with respect to the height of obstructions that may penetrate the airports Obstacle Protection Surfaces including structures or vegetation.

AERODROME STANDARDS

SECTION 2.0

2.1 General

Transport Canada publication TP312 Aerodrome Standards and Recommended Practices specifies the requirements for Aerodromes which are to be certified or certifiable under the Canadian Aviation Regulations. This document assigns a two-element reference code related to performance characteristics and dimensions of the critical aircraft.

Critical aeroplanes are defined as “the aeroplane or aeroplanes identified, from among the aeroplanes the aerodrome is intended to serve, as having the most demanding operational requirements with respect to the determination of movement area dimensions, pavement bearing strength and other physical characteristics in the design of aerodromes”.

2.2 Aerodrome Reference Code

The aerodrome reference code includes a number, which refers to the runway length requirement of the critical aircraft and a letter, which is based on the aircraft wingspan and outer main gear span. The reference code elements are as defined in the following tables.

Code Number	Aeroplane Reference Field Length
1	Less than 800m (2650ft.)
2	800m (2650ft) to 1200m (4000ft)
3	1200m (4000ft) to 1800m (6000ft)

Code Letter	Wingspan	Outer Main Gear Wheel Span
A	Less than 15m (49ft)	Less than 4.5m (15ft)
B	15m to 24m (49ft to 79ft)	4.5m to 6m (15ft to 20ft)
C	24m to 36m (79ft to 118ft)	6m to 9m (20ft to 30ft)
D	36m to 52m (118ft to 171ft)	9m to 14m (30ft to 46ft)

2.3 Instrument Meteorological Conditions

The certification criteria applicable to aerodromes are also determined by the instrument approach capability under which the aerodrome is intended to be operated. Three categories of requirements are defined based on the Minimum Descent Altitude (MDA) for non-precision approaches or Decision Height (DH) for precision approaches. These criteria are the specified altitudes at which a missed approach must be initiated during an instrument approach if the visual reference required to continue the approach to land has not been established. The instrument approach categories are as defined in TP308 – Criteria for the Development of Instrument Procedures as follows:

Precision	Minima lower than 250 ft. above runway threshold or aerodrome
Non-Precision	Minima not lower than 250 ft. above runway threshold or aerodrome
Non-Instrument	Minima not lower than 500 ft. above runway threshold or aerodrome

2.4 Night Operations

Aerodromes can be designed for Day Only or Night Operations. The primary difference is that an aerodrome intended for night operation will require the necessary night lighting. Aerodrome zoning criteria are the same for both cases, however the criteria will generally be applied more rigorously to an aerodrome intended for night operations than for day only operation.

Night is defined as the period of time when the center of the sun's disc is more than 6° below the horizon, and in any place where the sun rises and sets daily may be considered to be the period commencing one-half hour after sunset and ending one-half hour before sunrise.

For noise assessments night is considered to be from 10 pm to 7 am. The airport operator should review whether or not operations outside of these hours may have an undesirable impact on their community and amend the hours of operation of the airport accordingly.

Aerodromes can be certified for unrestricted night operations without obstruction marking if there are no obstacles higher than 90m (300 ft.) below the visual circuit altitude of 300m (1000 ft.) within a 3 nautical mile radius of the end of each runway. Merritt Airport has a number of obstacles which exceed these parameters.

An aeronautical study of Merritt Aerodrome was completed by Transport Canada in 1990 and identified a requirement for five hazard beacons to be located around the valley perimeter to provide visual reference for pilots at night (Ref. Appendix A). A design for on airport lighting was also completed at the same time. It is envisioned that costs would be in the order of \$1 million for on-site lighting, hazard beacons and obstruction lights.

Although lighting is a costly addition to an airports facility it can significantly extend operational capability for an operator contemplating scheduled service or frequent unscheduled stops in Merritt.

2.5 Aerodrome Characteristics

Table 1 illustrates some of the primary aerodrome characteristics that are defined in the certification standards for several of the Reference Codes and instrument approach capabilities considered for Merritt Airport.

2.6 Certification Criteria for Merritt Airport

Merritt Airport is currently registered as a Code 2B – Non-Instrument Aerodrome. Council directive has indicated a desire to be certifiable to a Reference Code 2C – Non-Precision Instrument classification in future. Each element of this Reference Code has been reviewed in terms of its suitability for the foreseeable future.

2.6.1 Runway Length

Table 1

Aerodrome Physical Characteristics

	Code 2			Code 3C
	2B Non-Instrument	2C Non-Instrument	2C Non-Precision	
Runway Length	1200m	1200m	1200m	1800m
Runway Width	23m	30m	30m	30m
Runway Longitudinal Slope	2.5%	2.5%	2.5%	1.5%
Runway Strip (each side of centerline)	30m	30m	45m	45m
Graded Area (each side of centerline)	23m	23m	23m	40m
Runway C/L to Taxiway C/L	42m	48m	n/a	63m
Taxiway Width	10.5m	15m	15m	15m
Taxiway Longitudinal Slope	3%	1.5%	1.5%	1.5%
Taxiway Strip (each side of centerline)	19.5m	26m	26m	26m
Runway C/L to Taxiway Holding Position	40m	40m	40m	75m

Code 2 indicates a limitation to aircraft requiring a runway length of 1200m or less which is the approximate length of the existing runway. It is generally accepted that a 1200m runway can accommodate up to 95% of general aviation aircraft. Figure 1 provides a sampling of typical aircraft that can utilize the runway under typical conditions. It should be noted that there are variants of several of the aircraft that may require a runway length greater than indicated. Also some Code 3 aircraft will be able to operate from a Code 2 length runway with appropriate operating limitations such as aircraft weight or environmental conditions.

Concern was raised that limiting the runway to a maximum of 1,200m length could present an impediment to future commercial development. A meeting of stakeholders was held in Merritt on May 27, 2003. The discussion centered on the need or lack of need for a longer runway and raised the following points:

- The existing airport lands will not accommodate runway extension so land acquisition would be required to extend to a Code 3 runway length.
- It appears technically feasible to extend to the north but fill requirement for an extension to the south make it impractical.
- A northerly extension would have to cross the Transmountain Pipeline and extend into lands owned by Nicola Ranch.
- Representatives of Nicola Ranch were not in a position to indicate whether or not land acquisition would be possible without further information.
- It appears that there currently is not a defined requirement by an air operator for a Code 3 runway length.
- There was some sentiment expressed that there may eventually be a requirement for a longer runway and that may require construction of an airport at a new location.
- Accommodation of Code 3 aircraft will increase runway strip width requirements and impact the limited land available for development on the airport.

It is envisioned that the existing runway length will accommodate any aircraft likely to operate into Merritt on a regular basis for the foreseeable future.

Coincidentally, the runway strip width requirement for Code 2 Non-Precision Instrument and Code 3 Non-Instrument are both 45m, which is the maximum width possible on the existing site without acquisition of adjacent lands. Thus, the runway could possibly be extended in future, if additional length was required, but Code 3 aircraft would be restricted to Non-Instrument Limits (500 ft. above the aerodrome). A review of instrument approach capability indicates that, with currently available technology and criteria, limits lower than 500 ft. will not be achievable.

Therefore, it is recommended that the Code 2 Non-Precision Instrument classification be retained and that it can be revisited should runway extension become a priority in the distant future.

2.6.2 Instrument Approach Capability

As discussed in Section 2.3, airports are required to comply with certification criteria for Non-Precision Approach if they have instrument approach procedures, which allow an approaching aircraft to descend to a Minimum Descent Altitude, which is lower than 500 ft. above the aerodrome (but not lower than 250 ft. where Precision Approach Criteria become applicable).

The potential of instrument approach for both Non-Precision Global Positioning System (GPS) and Localizer/DME and for Precision Approach Instrument Landing System (ILS) was assessed. It should be noted that some refinement of the design of the procedures may change the results slightly. Our findings of potential operating limits for Restricted Procedures (public limits will be higher) are as follows:

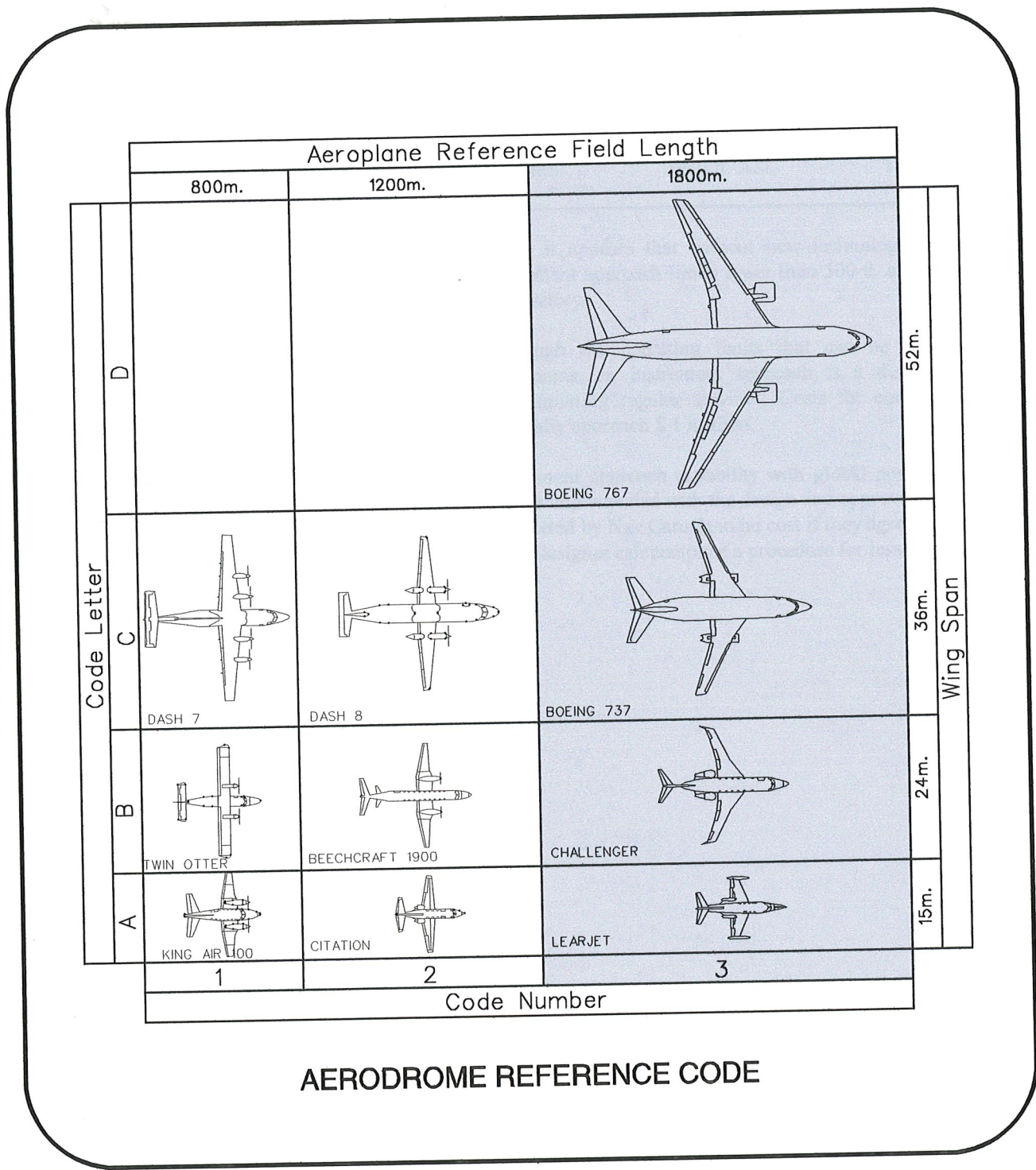


Fig. 1

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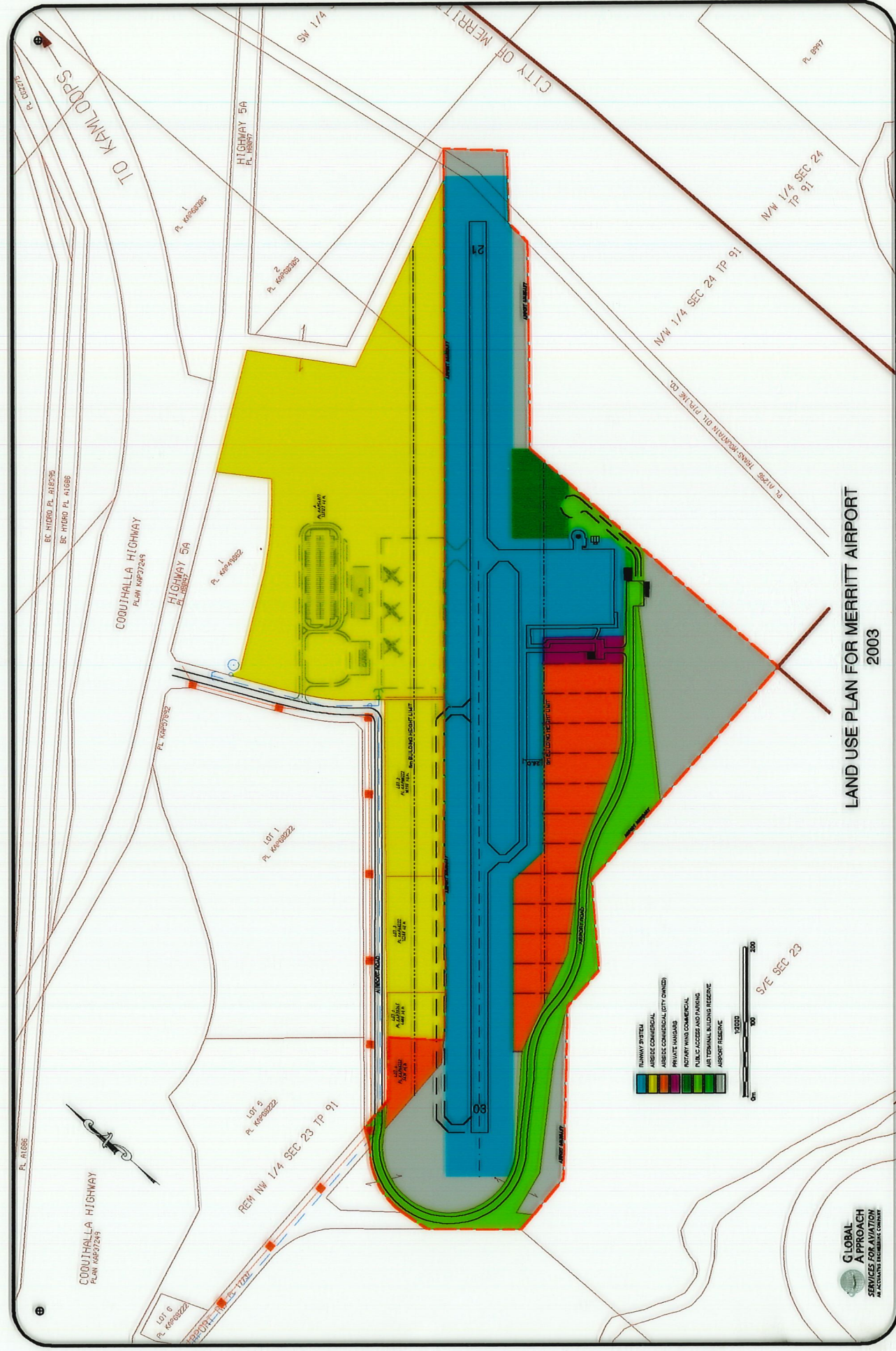
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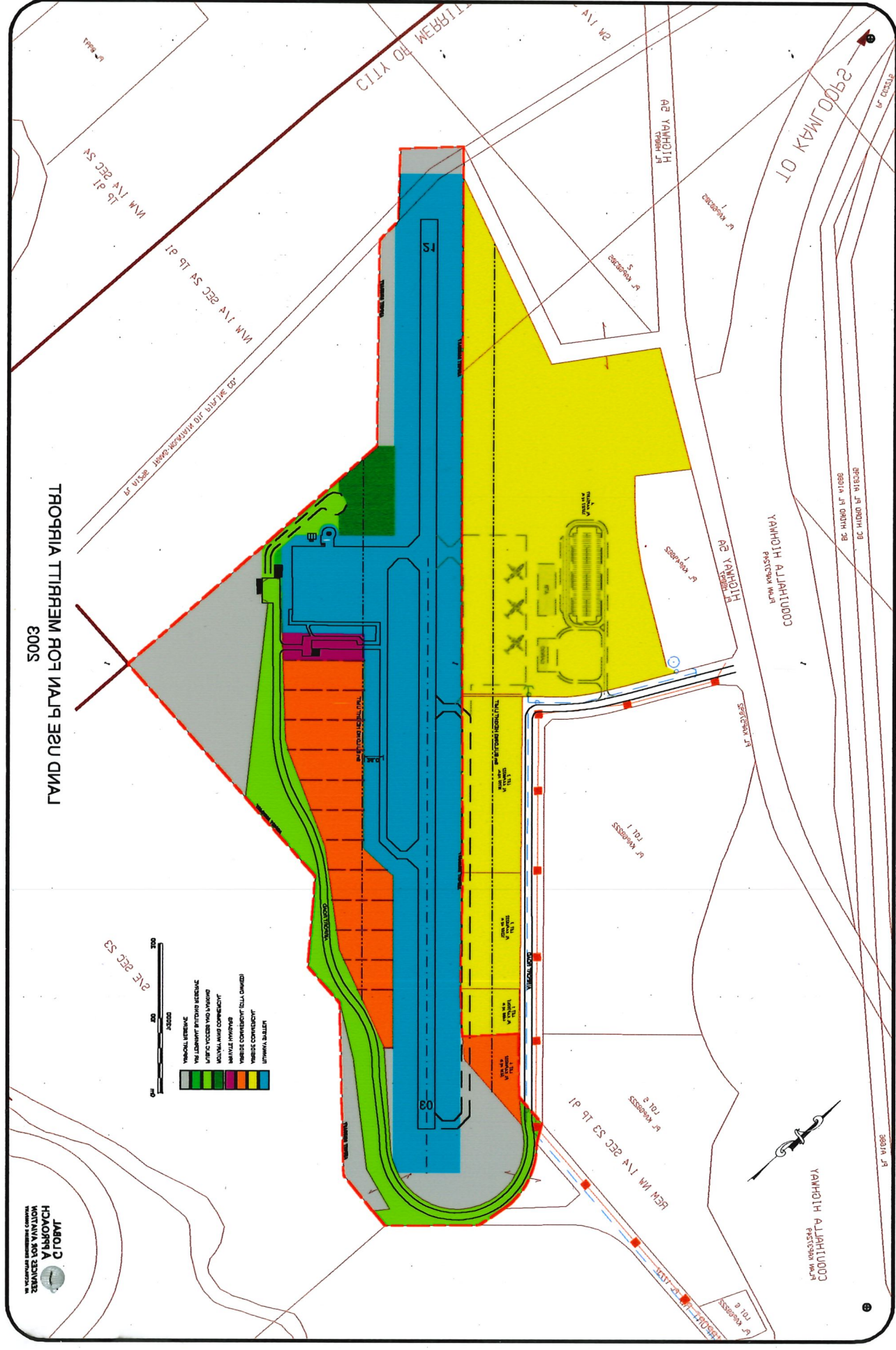
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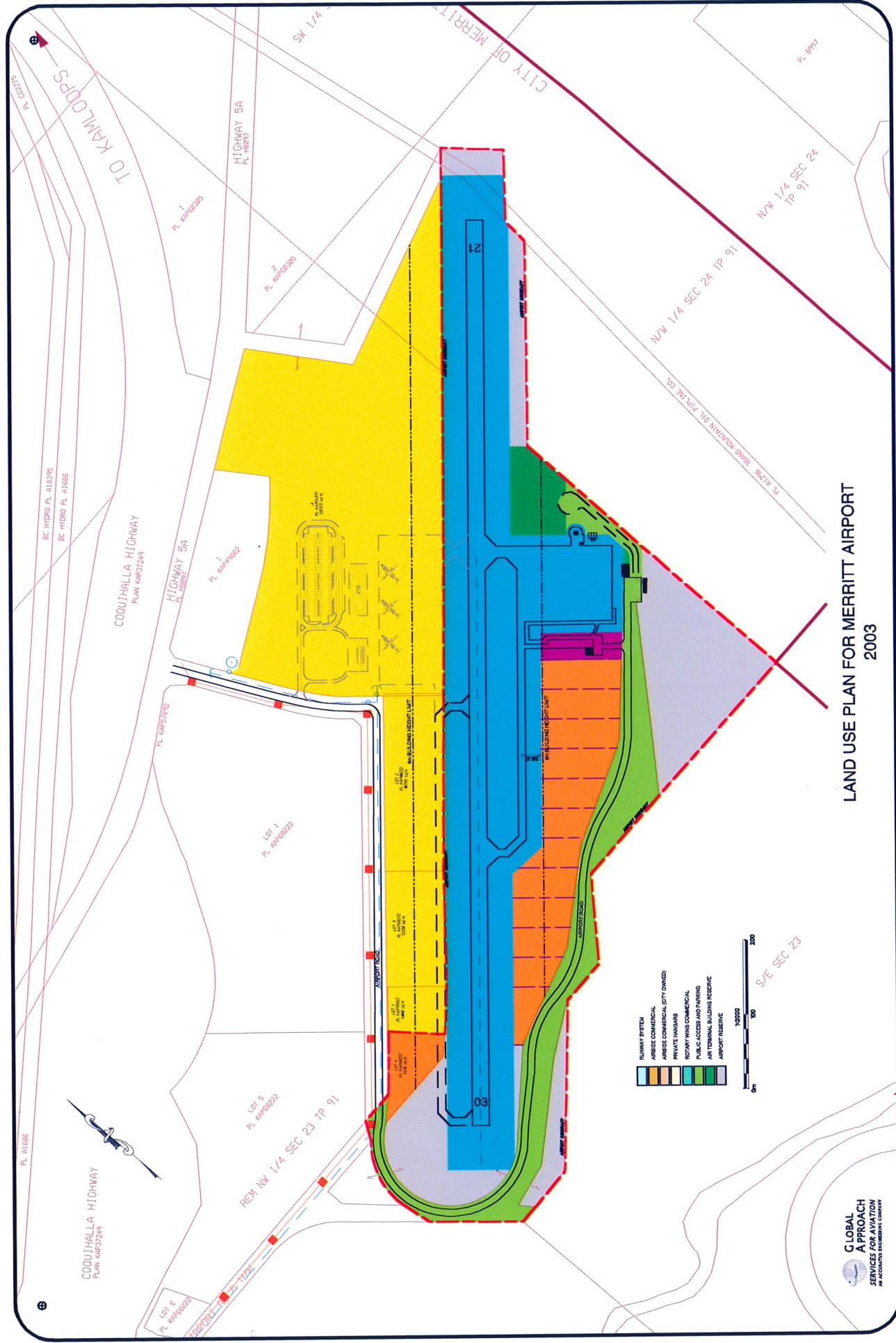
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Non-Instrument classification

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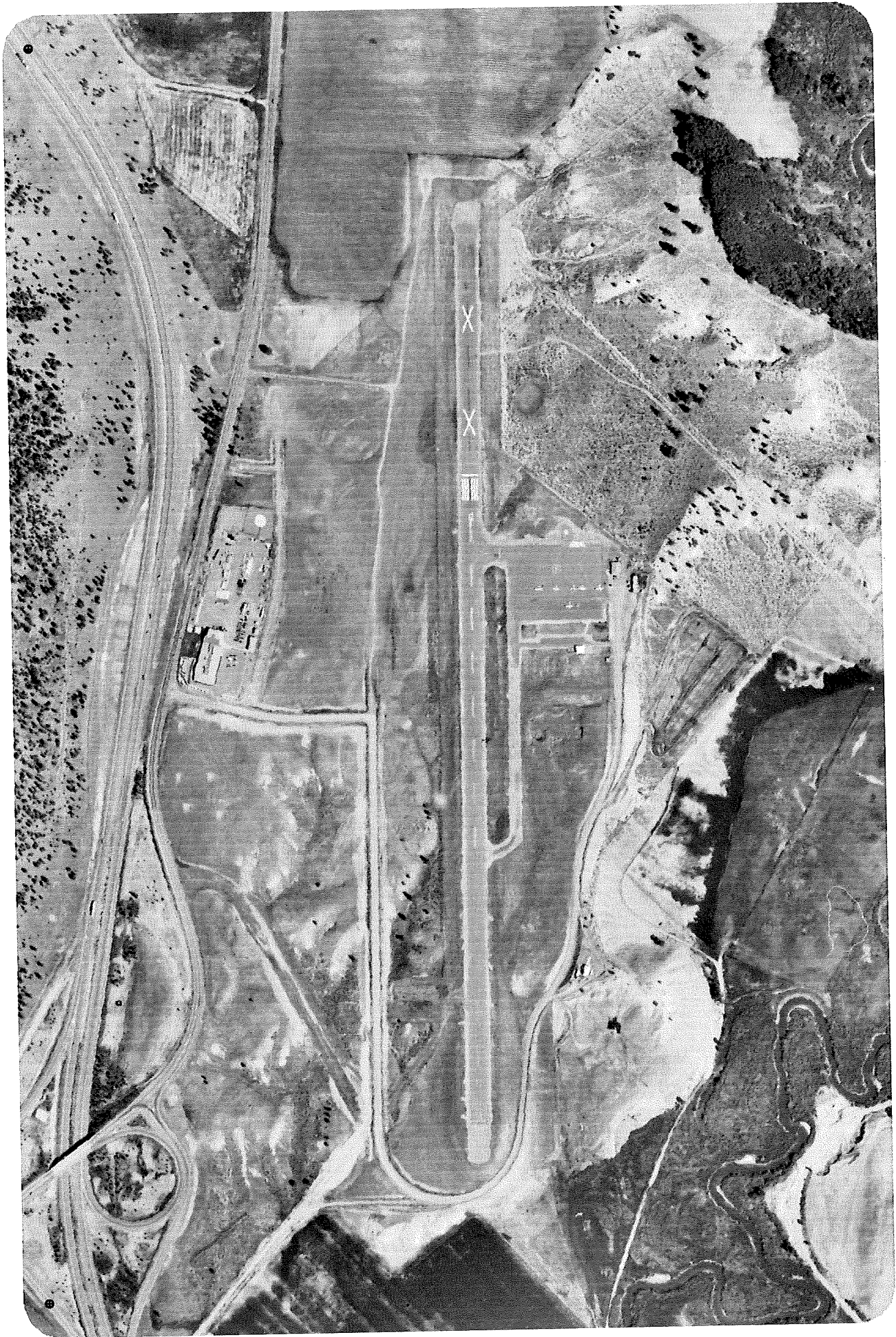
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LAND USE PLAN FOR MERRITT AIRPORT 2003



3.4 Airport Land Use

The airport site is very constricted by existing legal boundaries, steep slopes, the access roadway, the pipeline right-of-way crossing the north end, as well as private land holdings in both agriculture and commercial development on all sides. The site is marginally adequate for current requirements, as it does not have sufficient land area to contain its obstacle surface requirement. Some stakeholders feel that in the long term the community will expand and require an airfield capable of handling large jet aircraft. Additionally, the concern has been raised that the community's growth will see development surrounding the existing airport and create pressure to relocate it. Consideration should be given as to whether there are alternate sites for the airport in the long term that would address the concerns that have been raised. If it is concluded that there are no better sites available, additional measures to protect the long-term viability of the present site including acquisition of adjacent land areas should be considered.

3.4.1 Runway System

The runway system identifies the areas on the airport where aircraft are envisioned to maneuver including runways, taxiways, aprons, and helipads. Obstacle protection zones extend beyond paved surfaces to provide a safe area for the aircraft to operate. The following operating surfaces and obstacle protection areas are included.

	Length	Width	Obstacle Protection Area
Runway 03-21	1200m	23m	45m each side of centerline plus 60m beyond the end of pavement
Taxiway	300m	10.5m	26m each side of centerline
Apron	130m	100m	15m from edge of asphalt
Helipad	27m	27m	

3.4.1.1 Runway

The runway is currently 1200m long, which is the maximum Code 2 length. It is envisioned to provide an adequate length for any aircraft visiting Merritt on a regular basis for the foreseeable future including piston single and twin-engine aircraft, some light jet business aircraft, and turbo-prop passenger aircraft. At the present time we find no indication that a greater runway length is required.

Should the need arise for additional runway length, it remains possible with the present site provided the required land area can be obtained from the landowner to the northeast. Accommodating aircraft requiring greater than 1200m runway length would increase the airport certification requirements.

The runway strip width for Code 3 Non-Precision Instrument Approach is increased from 45m to 75m, which cannot be achieved on the existing site. However, a Code 3 Non-Instrument strip has identical dimensions to a Code 2 Non-Precision Instrument strip. As noted earlier, it is unlikely that Non-Precision Limits can be achieved at Merritt, so reducing to Certification to Non-Instrument would be unlikely to impact operations.

3.4.1.2 Taxiways

The existing partial parallel taxiway provides airside access to the airport lands on the south side of the runway as well as some reduction to backtracking on the runway for arriving and departing aircraft. The

taxiway is 10.5m wide with 57.8m separation from runway centerline to meet Code 2B Non-Precision Instrument certification requirement.

Should the runway ever be extended, the taxiway would meet the separation requirement for a Code 3B Non-Instrument runway. If the airport were ever to certify to a Code 3 Non-Precision Instrument standard, the taxiway would not comply with the 87m runway/taxiway separation requirement for Code B or the 92m requirement for Code C aircraft and operational limitations would be required.

A taxiway has been contemplated along the north side of the runway where it fronts the private development lands. It is envisioned this taxiway could be constructed through a cooperative effort by the private landowners or it could be constructed piecemeal by individual land owner. Alternatively private taxiways could be constructed to individual properties. TP312 (Para 3.4.1.4) recommends against this private taxiways accessing the runway directly and it should be avoided, if possible.

Obstacle protection areas are provided each side of taxiways to provide aircraft with a safe maneuvering area. The area is 21.5m both sides of centerline for Code B aircraft and 26m for Code C aircraft. No buildings or other obstructions to aircraft movement could be constructed within this area.

3.4.1.3 Aprons

The existing apron at Merritt Airport is 100m by 130m, which provides an adequate area for based and itinerant fixed wing aircraft operations. At the present time, the apron is utilized for parking and tie-down of light aircraft. Although there are no specific size requirement for apron areas, sufficient maneuvering area is required to conduct aircraft operations and maintain safe separations from other aircraft. It is envisioned that the existing apron could provide an adequate area for scheduled or charter operations for code B aircraft and possible Code C aircraft if light aircraft parking was managed appropriately. A 15m obstacle free area has been identified around the apron perimeter to preserve the capability to accommodate Code C sized aircraft. It is envisioned that the existing apron should be adequate for operations for the foreseeable future.

3.4.1.4 Helipad

An itinerant helipad sized for a Bell 212 or equivalent helicopter has been included near the proposed apron and terminal building. The touchdown pad would be concrete with the apron paved. The pad would accommodate enplaning and deplaning passengers, use of the terminal building and refueling for itinerant helicopters.

3.4.2 Terminal Reserve

Provision has been made for a 10m by 16m terminal reserve fronting the main apron, which would allow expansion of the existing building. Power, and telephone are provided to the terminal building. The terminal building has a well for water supply and septic sewage disposal system. The feasibility of connecting the terminal building to the municipal water and sewer systems on the north side of the airport is being examined.

3.4.3 Public Access and Parking

This area includes the existing Main Access Road to the airport as well as the parking lot adjacent to the terminal building, which can accommodate about 30 cars. This parking should be adequate for the foreseeable future unless scheduled services is initiated.

3.4.4 Airside Commercial

Airside Commercial Areas are intended to accommodate commercial operations requiring direct access to airside such as a fixed base operator, scheduled air service, or an air cargo facility.

Several Airside Commercial facilities can be accommodated on the private lands on the west side of the airport or on City lands on the east side. However, the type of development undertaken will be up to the individual landowner involved provided they comply with zoning and subdivision bylaw requirements of the City. A typical layout for Air Terminal Building, apron roads and parking for a regional sized airport has been shown on a portion of the private lands to illustrate the land area that may be required for such a development in the future. This illustration is not intended to presuppose the intentions of the landowner. The land is zoned M-1, Light Industrial, so it could be developed for non-airport use. Height of obstructions on the property will have to be restricted to preclude violation of transitional surfaces for the airport.

The C5 Airport Commercial Zoning bylaw requires a minimum lot frontage of 40m and a minimum parcel size of 2000 square meters. Lot lines have been shown on the City owned land on the eastside which comply with these minimum requirements. In actual fact, it is envisioned that lot widths would not be firmly set until a tenant had a specific requirement. The width of lot leases can be adjusted to individual requirements, however, leases should extend full depth from the roadway to the runway or taxiway setback requirements as shown.

Earth moving could be undertaken in the Airside Commercial area controlled by the City, however, it is recommended that it be left in its current condition for grading by the lessee. Placing non-structural fill in areas where buildings are to be constructed could actually increase costs for any future developer on the property and would not be a good investment for the City to undertake.

3.4.5 Rotary Wing Commercial

A small area for commercial lease suitable for one or two Rotary Wing Operations has been identified immediately north of the main apron. The existing ground lies below the runway and apron surfaces but should work adequately for helicopter operations. This location would provide for helicopters to approach the runway then hover taxi to the rotary wing area. A local road along the east edge of the air terminal building and apron would provide groundside access.

3.4.6 Private Hangars

An area immediately south of the existing apron has been designated for Private Hangars. It is envisioned that this area would be for hangarage of non-commercial hangarage. One hangar has already been constructed on the existing taxiway. It is envisioned that provision can be made for five or six hangars at this location.

3.4.7 Airport Reserve

Land areas which do not have a specific land use anticipated at this time have been designated Airport Reserve.

ADJACENT LAND USE

SECTION 4.0

4.1 General

Concerns with land use surrounding an airport are related primarily to three factors:

Obstacle Limitation Surfaces – are surfaces that are geometrically defined to limit the height of objects, which project into the airspace above an aerodrome so that aircraft operations at the aerodrome may be conducted safely.

Bird Hazards – land uses which attract large numbers of birds can increase risks of bird strikes with aircraft.

Aircraft Noise – land uses which can be impacted by predicted aircraft noise levels near the airport should not be encouraged.

4.2 Obstacle Limitation Surfaces

Non-instrument runways require two types of obstacle limitation surfaces to be established.

Takeoff / Approach Slope – originates at the end of the runway strip (60m beyond the runway threshold) and projects outwards at a prescribed slope and diverges at a prescribed rate for a specified distance. This surface defines the obstacle-free area for aircraft approaching or departing the airport.

To be in compliance with the requirements of TP312E Aerodrome Standards and Recommended Practices, the following takeoff / approach slopes, clear of obstacles, are required:

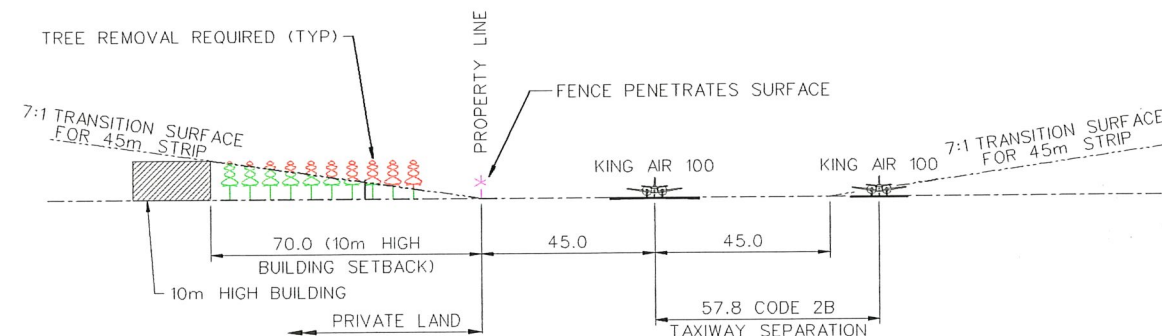
Reference Code	Slope	Length	Divergence
Code 2 Non-Instrument	4%	2500m	10%
Code 2 Non-Precision	3.33%	2500m	10%
Code 3 Non-Instrument	2.5%	2500m	10%

A height of 4.5m above a roadway is required to allow for moving obstacles such as automobiles and trucks.

Merritt Airport is exposed to potential violation of its approach slopes for both runways as it only controls the land to the end of the runway strip. The land under the approach surface to Runway 03 drops away steeply down to the more level land below making it unlikely that a structure or vegetation would reach a height where it would infringe on the approach surface. At the Runway 21 end the ground falls more gently to the agricultural land and is only approximately 2m below the runway at the property line. This situation gives rise to a significant possibility and off airport violation of the take-off approach surface. TP312 recommends that the inner edge of the take-off approach surface should be located so that the surface should clear the airport boundary by 9m. This would require that the boundaries be extended by about 250m at both ends of the runway.

Transitional Surface – originates at the edge of the runway strip and angles upwards away from the runway at a specified slope. This surface defines the obstacle-free area along both sides of the runway with higher obstacles allowed at greater distance from the runway. This surface is used to define how close to the runway obstructions such as buildings, parked aircraft or trees can be permitted.

The existing airport property is very narrow to accommodate the proposed 45m Code 2 Non-Precision runway strip. Most of the north side of the airport the property line is only 45m from runway centerline meaning the transitional surface starts at runway elevation at the property line. The surface rises 1 ft. vertical for each 7 ft. horizontal as illustrated below. Any significant development or vegetation on the private lands near the property line will violate the transitional surface.



TRANSITIONAL SURFACES 45m STRIP

It is understood that the private landowners along the property line have been advised of the limitations to development of their lands and seem to be accepting of these conditions.

There is no formally binding provision at this time to prevent obstruction of the obstacle limitation surfaces for the airport. The airport has significant risk of violation occurring because of the limited land area controlled by the City of Merritt.

There are two possible methods for protecting the airport from encroaching obstacles:

1. Registered Airport Zoning can be imposed over lands adjacent to an airport to prevent the land from being developed in a manner that the Minister of Transport deems is:
 1. Incompatible with the operation of an airport.
 2. Incompatible with the safe operation of an airport or aircraft.
 3. Likely to cause interference with signals or communications to and from aircraft.

Registered Airport Zoning, if enacted, would prevent new obstacles from penetrating the obstacle limitation surfaces described above or an existing penetration from being increased. Additionally, adjacent land use, which would attract birds, for example, or interfere with radio communications or navigation aids, could be legally prevented. Limitations can be placed on the height of existing vegetation so that the owner becomes responsible to limit tree growth, for instance.

There is considerable process and expense involved in establishing Registered Airport Zoning. Transport Canada advises the cost, largely for legal expenses, is typically \$50,000 to \$75,000 and

can take two to three years to complete. The process is initiated with Transport Canada and can be left to them or kept partially under local control, which may be expected to improve expediency and reduce costs.

Few airports, other than those owned by Transport Canada, have established legal zoning, however, it would seem to offer significant protection against future encroachment of development reducing airport viability.

2. Transport Canada has recently worked with the City of Vernon to establish a linkage between local bylaws and the powers of the Aeronautics Act through the Municipal Act. The intent of the instrument is to provide protection for airport zoning without the high cost and process of Registered Airport Zoning. This approach has only been used at one airport to date but should be implemented more readily for additional airports as the agreements with Transport Canada and the provincial government have been put in place.

4.3 Bird Hazards

Transport Canada document TP1247 Land Use In the Vicinity of Airports cites two areas of concern in attracting birds towards airports with the potential to present a hazard to aircraft.

1. Extremely Hazardous Land Use Practices – Not Recommended within 8 km of an Airport:
 1. Food Waste Landfill Sites
 2. Coastal Commercial Fish Processing Plants
2. Moderately Hazardous Land Use Practices – Not Recommended within 3.2 km of an Airport:
 1. **Agricultural Practices**
Grains (Barley, Oats, Wheat)
Corn
Sunflower
Fruits (Berries, Cherries, Grapes or Apples)
Feedlots
 2. **Commercial Activities**
Outdoor Theatres
 3. **Managed and/or Supplemented Natural Habitats**
Migratory Waterfowl Refuges/Feeding Stations/Crops
Designated Game-Mammal Refuges
 4. **Other Activities**
Food Garbage
Freshly Tilled or Plowed Soil
High insect or mouse activity
Livestock manure piles
Lagoons.

The only conflict at this time is with agriculture and it has not been reported as an issue. There may be potential for garbage attracting birds to the new developments at the truck stop, which should be

monitored. Any new developments proposed should be assessed as to whether or not they may attract an inordinate number of birds.

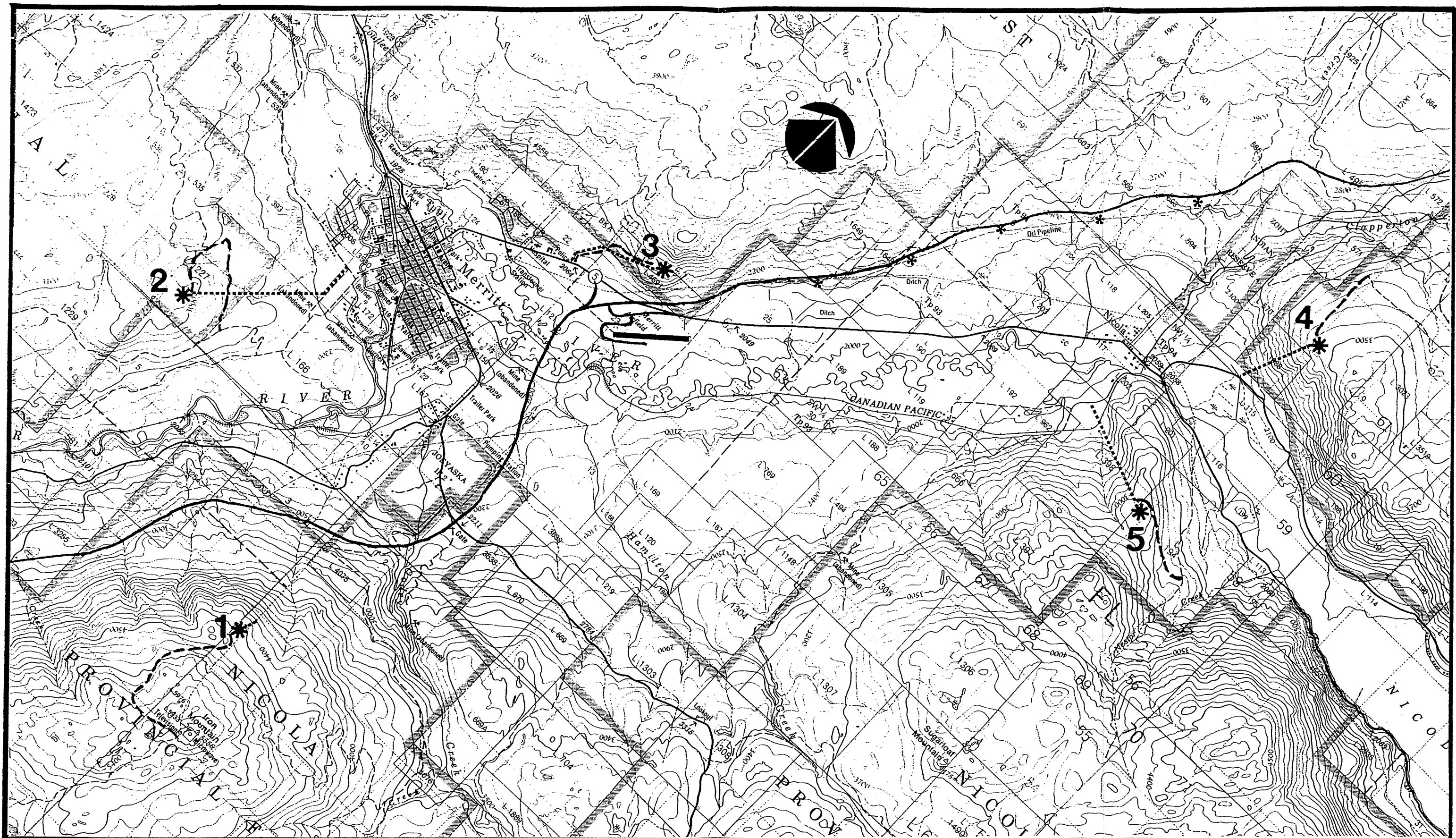
4.4 Aircraft Noise

Over the years airports have become busier, residential land uses have tended to spread closer to airports, and the public has become more environmentally aware and more vocal in their concerns about aircraft noise.

Aircraft noise is not expected to be an issue at Merritt Airport for many years to come for the following reasons:

1. The airport is used by relatively small, less noisy aircraft. However, addition of jet service could drastically increase noise levels.
2. Proximity and type of adjacent development is not particularly noise sensitive.
3. Night operations significantly impact sensitivity to noise. There are no night operations at the present time but addition of this capability could significantly change public sensitivity to aircraft noise.

The City of Merritt needs to be aware of the noise issues that may arise if residential development begins to encroach on the airport. The proposed motel adjacent to the airport may also give rise to noise complaints. Night operations would also significantly increase noise concerns from local residents.



CITY OF MERRITT

**MERRIT AIRPORT, B.C.
(SAUNDERS' FIELD)
PROPOSED HAZARD BEACON LOCATIONS**

Legend: - PROP. HAZARD BEACON*

- PROP. OBSTRUCTION LIGHT*

- PROP. ROAD ACCESS OR IMPROVEMENT -----

- PROP. POWERLINE*

SCALE :- 1:50,000

ACCURATUS
Engineering Ltd.

