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SEABOLT AREA STRUCTURE PLAN

BYLAW 16.91

1.0 INTRODUCTION

Some country residential development has occurred in the Seabolt area in the past, and a number of inquiries and applications regarding further country residential, and some rural recreation, have been received by the I.D. of Yellowhead. Under the circumstances, an area structure plan is required to ensure the creation of a safe and efficient internal circulation system and an appropriate land use pattern. Such a plan is also needed to deal with water supply and sanitary sewage disposal.

In the Seabolt area two other issues have particular significance. Alberta Transportation advises as follows:

Alberta Transportation and Utilities' future plans include continuation of the four laning of Highway 16, west of Highway 40 to the Jasper Park gate. This future multi-laning will occur adjacent and parallel to the east limit of the present right-of-way and within the Seabolt Area Structure Plan. Ultimately, Highway 16 is projected to become a freeway, with all at-grade intersections eliminated and accommodated by local collector service roads directing traffic to the highway at interchange locations. It is anticipated that these improvements will be staged over a very long period of time in the future. It is not known when the existing at-grade intersections will have to be eliminated, but that decision will be made by Alberta Transportation and Utilities and will depend on traffic operations and safety at those locations.

Identifying the best possible alternatives for long term access to Highway 16 is one of the basic objectives of this plan.

The plan area is traversed by Maskuta Creek, Iron Creek, and Cold Creek. Since the Improvement District wishes to minimize the possibility of significant permanent development occurring within the floodplains of these creeks, a second basic objective of the plan is to identify flood hazard lands within the plan area as potential constraints to development.

MUNICIPAL AFFAIRS

Office of
the Minister

IN THE MATTER OF THE

IMPROVEMENT DISTRICTS ACT
Being Chapter I-1, R.S.A., 1980

and the

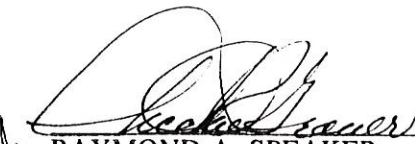
PLANNING ACT
Being Chapter P-9, R.S.A., 1980

and

Adoption of an Area Structure Plan
Improvement District of Yellowhead No. 14

PURSUANT to Section 16(1) of the Improvement Districts Act, and Section 64 of the Planning Act, I, RAYMOND A. SPEAKER, Minister of Municipal Affairs, as Council for the Improvement District of Yellowhead No. 14, DO HEREBY ORDER THAT:

The Seabolt Area Structure Plan is adopted and shall come into effect on the date of signing this Order.


RAYMOND A. SPEAKER
Minister of Municipal Affairs

DATED at EDMONTON
in the PROVINCE of ALBERTA

this 22nd day of November, A.D., 1991.

**DRAFT
SEABOLT
AREA STRUCTURE PLAN**

**Prepared for:
Improvement District of Yellowhead #14**

October 1991

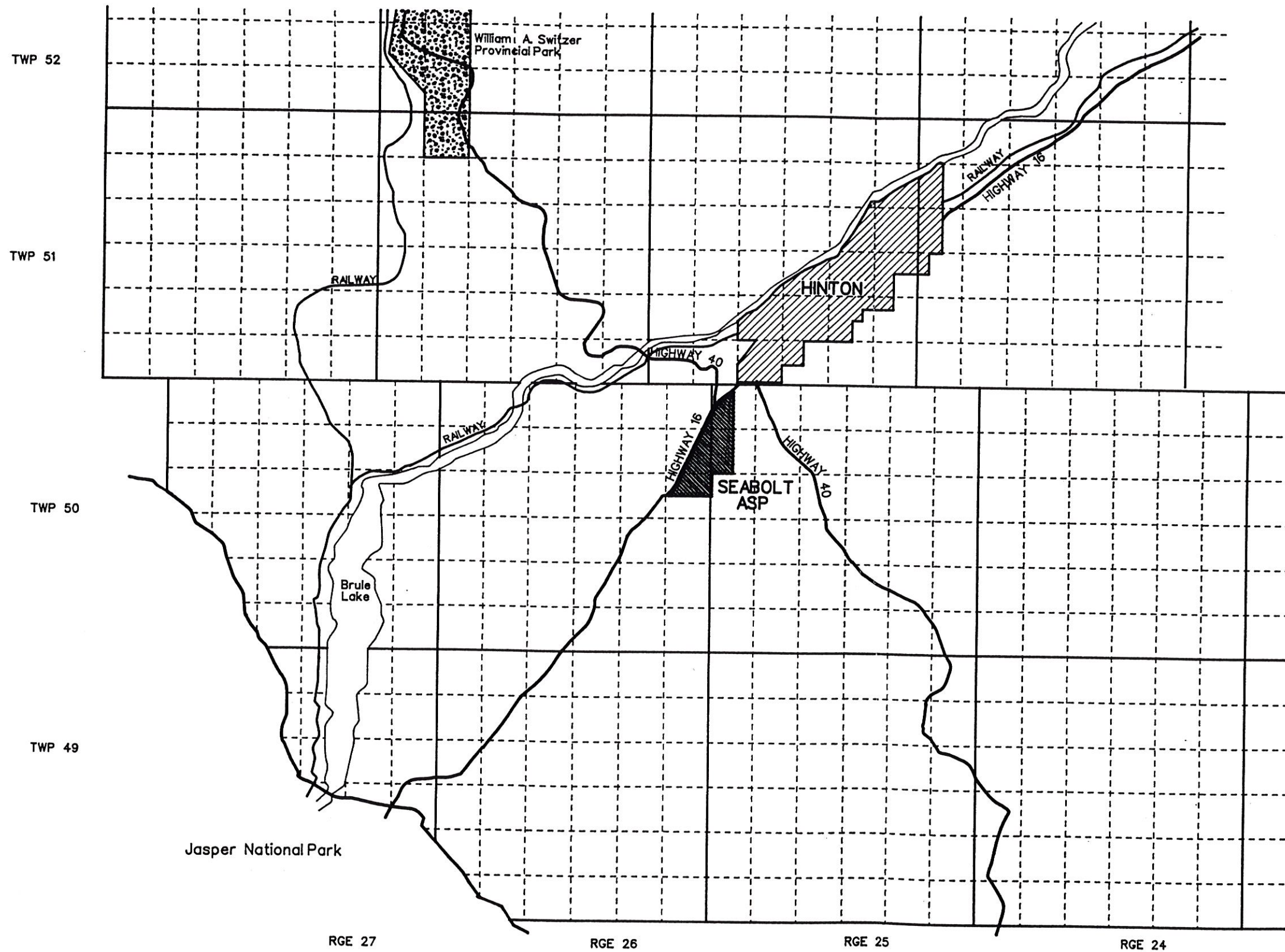
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* Large scale version in pouch



SEABOLT RIDGE AREA STRUCTURE PLAN

I.D. OF YELLOWHEAD NO. 14



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MAY 1991

LOCATION PLAN

2.0 PLANNING CONTEXT

2.1 General

The Yellowhead Corridor, which includes the Seabolt area, has been the subject of numerous extensive research and planning exercises. There has been, at least at a general level, a thorough cataloging of physical conditions in the area. In addition, many policies relating to land development have been proposed and approved. These studies and plans were thoroughly reviewed as part of the preparation of this area structure plan. The development concept and policies contained in this plan are based on and/or consistent with these prior documents. The paragraphs below provide general descriptions of these prior documents and highlight relevant information and policies provided by them. Because these descriptions are general in nature, reference should be made to the original documents with respect to specific policies or items of information.

2.2 Yellowhead Regional Plan

The Yellowhead Regional Plan is a statutory document which provides general development policies applicable to the entire Yellowhead Region. This region extends from just west of Edmonton to the Jasper Park gates and centers on the Yellowhead Route (Highway 16). Within this region, all area structure plans must conform to the Yellowhead Regional Plan.

The regional plan encourages the use of area structure plans as a means of ensuring orderly country residential development. The regional plan encourages the consideration of the following relevant variables in their preparation:

- servicing requirements
- servicing costs
- access
- hazard lands
- environmentally sensitive areas
- residential infilling
- effects on urban municipalities

The regional plan prohibits multi-parcel country residential development on better agricultural land. It emphasizes the need for an efficient internal circulation network, and the protection of transportation facilities providing regional or higher levels of service.

The regional plan encourages the planning for, and development of, tourism facilities and programs by both the public and private sectors.

2.3 Improvement District of Yellowhead No. 14 General Municipal Plan

The Planning Act requires that the Seabolt Area Structure Plan conform to the provisions of the ID 14 General Municipal Plan (GMP). The ID 14 GMP, which provides somewhat more detailed development guidance than the regional plan, also encourages the use of area structure plans to control country residential development. To the list of factors to be considered, the ID 14 GMP adds development staging, impact on adjacent lands, and population density.

The ID 14 GMP requires a "joint agreement" between the ID and the Town of Hinton as a precondition of country residential development within the urban fringe area of the Town of Hinton. For this purpose, the urban fringe is defined as the area within a 5 mile radius of the Town of Hinton. This includes the Seabolt area. On June 24, 1991, a memorandum of agreement satisfying this requirement was signed.

The ID 14 GMP contains numerous policies relative to development near major highways. These policies emphasize the minimization of conflict between regional or provincial transportation facilities and adjacent land uses.

Tourism related development is generally encouraged in the ID 14 GMP. However, the plan emphasizes that such development should be compatible with the natural environment and adjacent development. The GMP also emphasizes the identification, preservation, and promotion of historical resources within the municipality.

2.4 Coal Branch Sub-Regional Integrated Resource Plan (IRP)

This plan was published in September, 1988, by Alberta Forestry, Land and Wildlife to control land use, resource extraction, and development on crown-owned land. An updated version was published in March, 1991. Because the Coal Branch IRP applies only to crown-owned land, it has little direct impact on the Seabolt area which is almost completely privately owned. However, the plan has implications for the use of land adjacent to the plan area and its general policies express the preferences of the provincial government with respect to development throughout the IRP area.

The Coal Branch plan area is subdivided into Resource Management Areas (RMA). The Seabolt area falls within the Yellowhead Corridor Resources Management Area which extends from the Town of Edson along the Yellowhead Highway to a point approximately 6 miles short of the Jasper Park gates.

The IRP is based on an Integrated Resource Inventory prepared for the Coal Branch Study Area and published in 1985 by Alberta Energy and Natural Resources. This document contains an abundance of technical information regarding the natural resources in the Athabasca Valley Physiographic Subregion/Ecodistrict within which the Seabolt area lies. The Coal Branch IRP sets out objectives and guidelines with respect to such topics as "water and watershed, recreation and tourism, agriculture, and settlement". These objectives and guidelines apply to specific Resource Management Areas (RMA's) within the Coal Branch land.

The Coal Branch IRP, in its resource management objectives relative to settlement, encourages country residential development "... in areas where physical infrastructure and/or such land uses already exist." The objectives and guidelines relevant to Recreation and Tourism support the development of commercial and recreation facilities along the Yellowhead Highway (Highway 16).

The IRP identifies those lands considered to have historical or paleontological resource potential. Township 50, Range 26, W5M is specifically identified as being of paleontological interest. In general, the Coal Branch IRP suggests that all of the Seabolt area should be regarded as having general historical, archeological, and paleontological potential. Alberta Culture confirms this, and will require specific review of all major development proposals.

2.5 Hinton-Jasper Corridor Planning Study

This study was prepared by the Yellowhead Regional Planning Commission for the Improvement District of Yellowhead and was adopted in March 1989. The study was largely based on a Resource Inventory and Land Use Evaluation of the Hinton-Jasper Corridor prepared in 1986 by Alberta Energy and Natural Resources. Both documents apply to an area along the Yellowhead Highway between the Town of Hinton and Jasper National Park. The Seabolt area is included within the study area boundaries.

The Resource Inventory and Land Use Evaluation provides a technical evaluation of the suitability of the study area lands for various types of development. This evaluation is expressed in the form of a map and table which rate specific sub-areas according to their suitability for particular types of development. This rating system was employed in the Hinton-Jasper Corridor Study as a basis for the identification of lands having "limitations to development". Within the Seabolt area, the land near Maskuta and Cold Creeks is described as having "severe" limitations to development, while in the remainder of the Seabolt area, only "moderate" limitations to development occur.

The Study's management policies with respect to country residential development prohibit such development on lands exhibiting severe or very severe limitations to development. Country residential lot areas are to range between 1.6 ha (4 acres) and 4 ha (10 acres). The Study also sets out a number of conditions under which country residential development may be supported. This plan designates areas for development where these conditions are satisfied.

Finally, the Study sets out specific information to be provided as part of an area structure plan which includes country residential land use. This plan has been prepared to respond to these requirements.

With respect to rural recreation facilities, the Study advocates their development in the Hinton-Jasper Corridor. However, such development is to be controlled by "... an architectural and development guideline...", and should "... complement and enhance the natural beauty and setting..." of the Corridor, and should include recreation opportunities and/or facilities in addition to accommodation.

2.6 Improvement District of Yellowhead No. 14 Land Use Order

The ID's Land Use Order controls development on specific parcels of land and implements many of the policies and provisions of the plans and studies described above. The Land Use Order also contains various development regulations relating to country residential and rural recreational development. The Land Use Order is one mechanism which will be used to implement the development policies set out in this area structure plan.

While it is not legally necessary for this area structure plan to conform to the Land Use Order, as a practical matter, this plan recognizes the constraints on development imposed by the Land Use Order, and deals with land use categories in terms complementary to those employed in the order.

3.0 SITE CHARACTERISTICS

3.1 Location

The Seabolt plan area is located southwest of Hinton on the southeast side of Highway 16. It includes approximately 800 acres of land, and extends approximately 1 mile east of Highway 16 at its widest point (See Figure 1). Highway 40 lies approximately 1 mile east of the plan area.

3.2 Topography

Topography within the plan area varies dramatically from west to east. In general, the area near Highway 16 is relatively flat former lake bottom. Through this area, the creek channels provide the most dramatic topographic variations. From the southeast corner of NE 25-50-26-5 northeast to the point at which Maskuta Creek passes out of the plan area to the east, runs a clearly defined "terrace" approximately 6 m in height. As Maskuta Creek passes into Section 31-50-25-5, it becomes deeper, with clearly defined valley walls. At the northern end of the plan area, the Maskuta Creek Valley wall drops more than 20 m.

Moving along the highway from north to south, the general ground level relative to the highway changes. In the north the highway is as much as 20 m lower than the general ground level while at the extreme south end of the plan area, the highway is more than 10 m higher than the ground level.

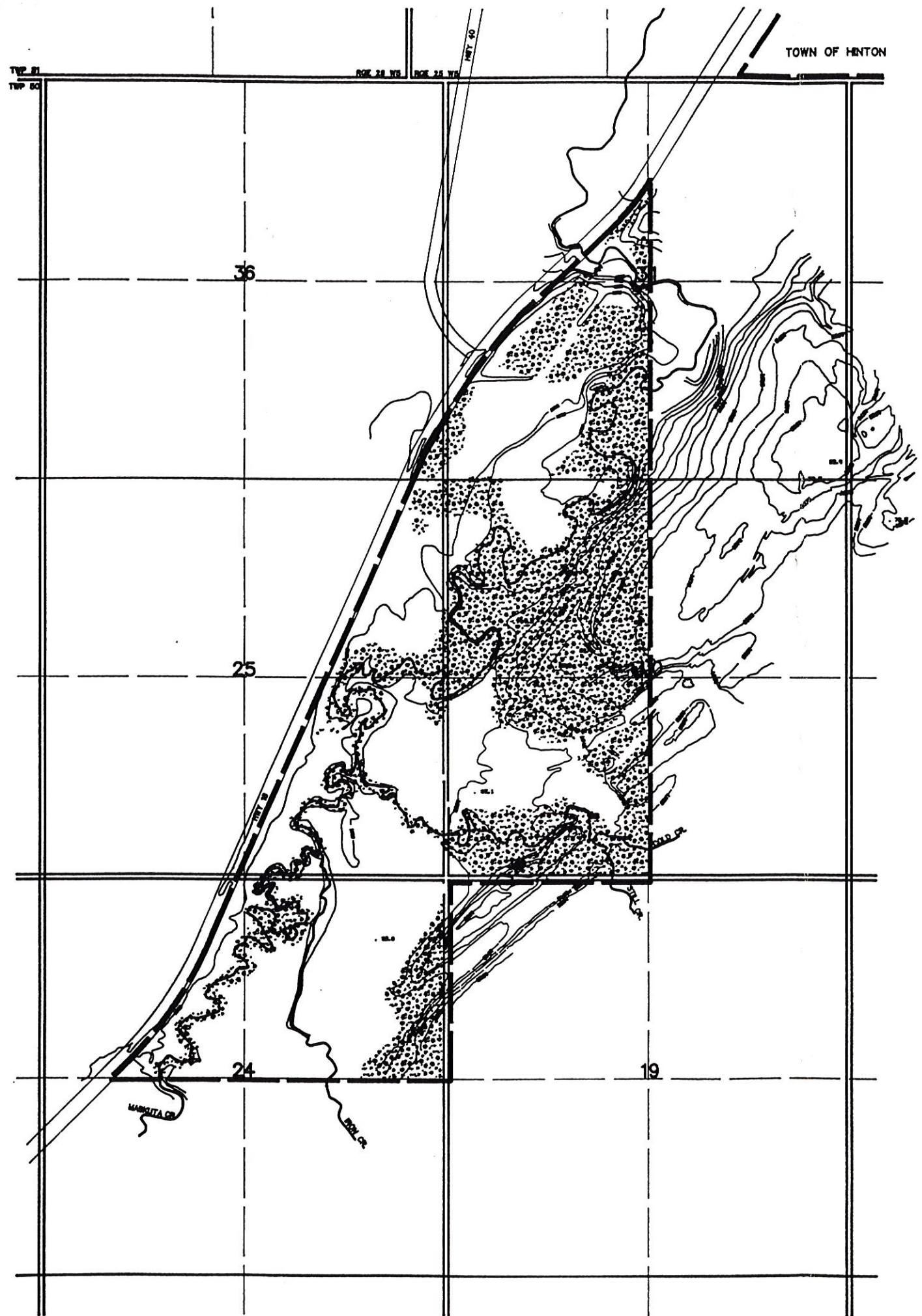
With the exception of the Maskuta Creek Valley at the north end of the plan area, and the Cold Creek Valley in the SW 30-50-25-5, land along the east boundary of land area rises dramatically with a change in elevation of as much as 30 m.

Specific contours are shown in Figure 2 Natural Features.

3.3 Vegetation

The two main areas of significant vegetation within the plan area are those associated with Muskuta Creek and those associated with relatively steep slopes. The species present are described in some detail in the technical documents referred to in Section 2.0 of this document. In general, at lower levels white spruce and balsam poplar predominate, but these are replaced by lodgepole pine as elevation increases. In poorly drained areas, black spruce, willows, and swamp birch may be found.

Vegetation is shown in Figure 2 Natural Features. For purposes of this plan, vegetation is significant as an aesthetic feature, as erosion protection, and as a potential source of fuel for wildfire.



SEABOLT
 RIDGE
 AREA STRUCTURE PLAN
 I.D. OF YELLOWHEAD NO. 14

 TREE COVER

CONTOUR INTERVAL - 5m



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NATURAL
 FEATURES

3.4 Watercourses

The plan area is traversed by three significant creeks: Muskuta Creek, Iron Creek, and Cold Creek. Still Creek passes through a short section of the plan area before joining Cold Creek. These features are shown in Figure 2 Natural Features.

These creeks, particularly Maskuta Creek, are significant in the context of this plan as aesthetic features and as barriers to traffic circulation. They are, however, most important as a potential constraint to development depending on the extent of their floodplains. Appendix A deals with the definition of the floodplains of each of these creeks. Figure 4 Development Constraints depicts the area of land contained within floodplain areas.

3.5 Soils and Groundwater

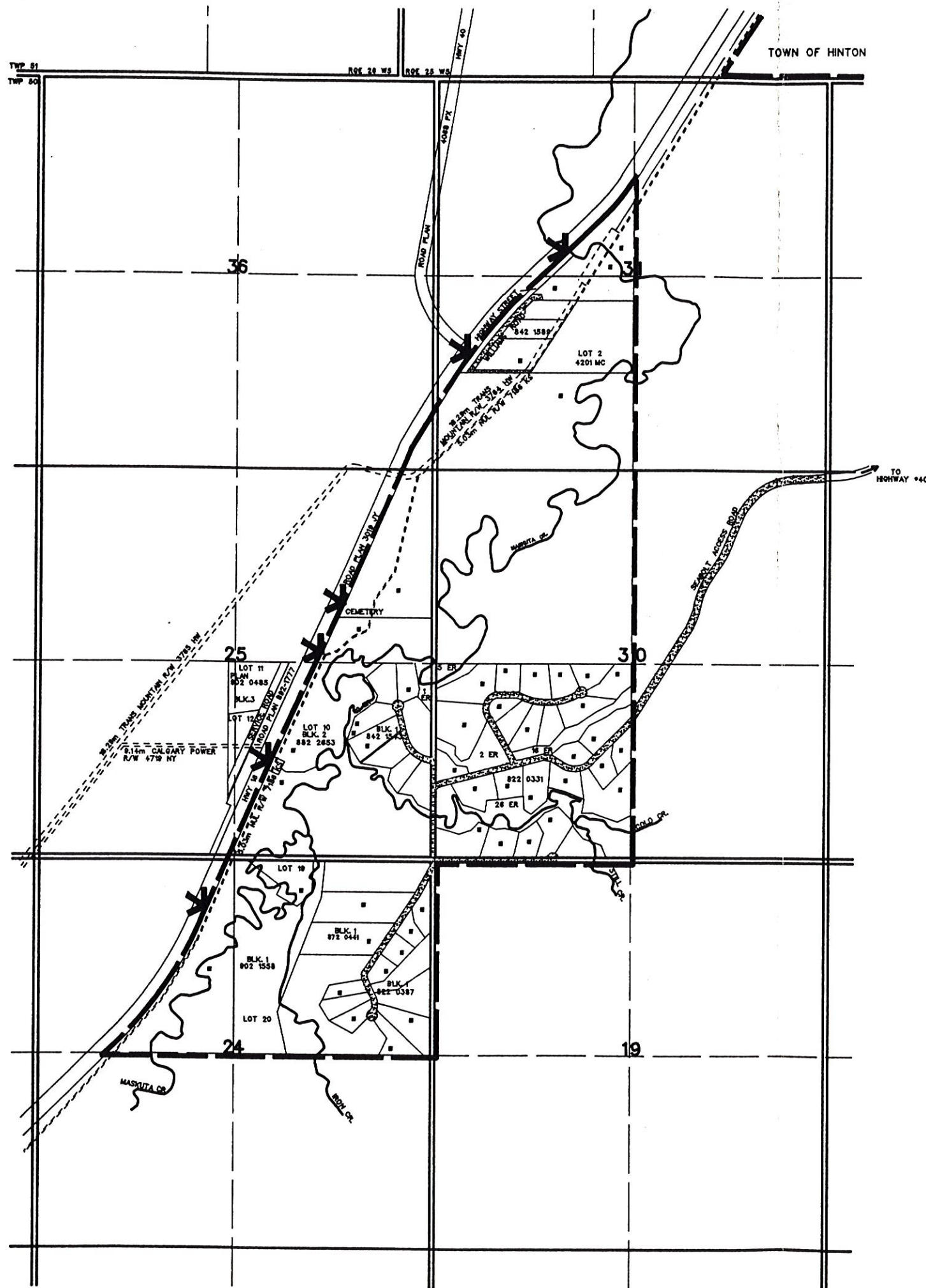
The Coal Branch Resource Inventory rates land west of Maskuta Creek in the north portion of the plan area, and land in the central south half as being "marginal arable", with the remainder of the area being non-arable. The Canada Land Inventory rates the land within the plan area 5, 6, 7, and Organic. These soils have a very severely limited capability for agriculture.

It should be noted that virtually the entire area is subject to a High to Very High wind erosion hazard.

Groundwater is potentially significant to development in two respects. First, a high water table may result in basement flooding and may increase the likelihood of groundwater contamination from private septic systems. Second, the quantity and quality of groundwater is important as a source of potable water. Groundwater and soil conditions in the plan area are discussed in Appendix B.

3.6 Access and Circulation

There are several points of direct access from Highway 16 serving existing lots on the west side of the plan area (see Figure 3 Existing Development). One of these connects directly to a public road right-of-way and serves several lots while the remainder are private driveways for one or two lots. The existing country residential development in the eastern portion of the plan area is served by the Seabolt access road which connects east to Highway 40. Because there is no public road connection between the lots to the west, served by Highway 16, and the lots to the east, there is no alternative access to the country residential development in the Seabolt plan area. Public road access to the existing country residential development would be eliminated if the Seabolt access road were rendered impassable. It should be noted, however, that the absence of a public road connection between the country residential developments and Highway 16 works to preserve the privacy of the Seabolt area residents.



SEABOLT RIDGE AREA STRUCTURE PLAN

I.D. OF YELLOWHEAD NO. 14

➔ ACCESS POINT

▬ DEVELOPED ROAD

▭ DEVELOPED LOT



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EXISTING DEVELOPMENT

3.7 Existing Development

Figure 3 Existing Development shows the extent of residential subdivision in the plan area. Existing dwellings are also indicated.

Land use in the area is country residential, occasionally with associated minor agricultural pursuits. The Bar F Ranch offers some public accommodation which represents the only commercial activity within the plan area. There is no industrial or institutional land use.

Several land owners within the plan area have expressed interest in or have applied for approval for additional country residential and rural recreational developments within the plan area. To the extent these intentions are known, they have been considered in the preparation of this plan.

3.8 Utility Rights-of-Way

Only two utility rights-of-way affect the plan area. One is the Northwestern Utilities Limited right-of-way (Plan 7186 KS) which generally parallels Highway 16. At the southwest corner of SW 31-50-25-5, a Trans Mountain Pipeline right-of-way (Plan 3765 HW), enters the plan area from the west and turns north. The NUL right-of-way parallels and abuts the Trans Mountain right-of-way until they pass out of the plan area at its northern end.

The Trans Mountain Pipeline at times contains petroleum products at high vapour pressure (above 240 Kpa). The Energy Resources Conservation Board recommends a minimum setback for habitable buildings of 5 m measured from the pipeline.

3.9 Municipal Servicing

Major municipal services (water, sanitary sewer, underground storm water drainage) are not available in the plan area. The Improvement District has no plans to provide any such facilities within the plan area. Franchise or shallow utilities such as natural gas, electrical power, and telephone are available and can be extended to serve future development.

4.0 DEVELOPMENT CONSTRAINTS

Figure 4 depicts those areas which should not be considered for substantial development of a permanent nature. It also depicts areas in which certain restrictions on development should be imposed in recognition of physical constraints on development.

These constraints to development have been identified and mapped without reference to existing or proposed subdivision or development. They are based upon the physical characteristics of the land and current development controls contained in the Land Use Order.

4.1 Extreme Slopes

The Land Use Order, in Section 38 (5), prohibits development within 30 m of the top or bottom of a slope exceeding 30% grade. Figure 4 identifies areas where such slopes exist and adds the 30 m separation.

This constraint does not prevent the inclusion of lands having steep slopes within country residential lots. However, each lot created must have a developable building site to receive municipal support for subdivision approval.

4.2 Floodplains

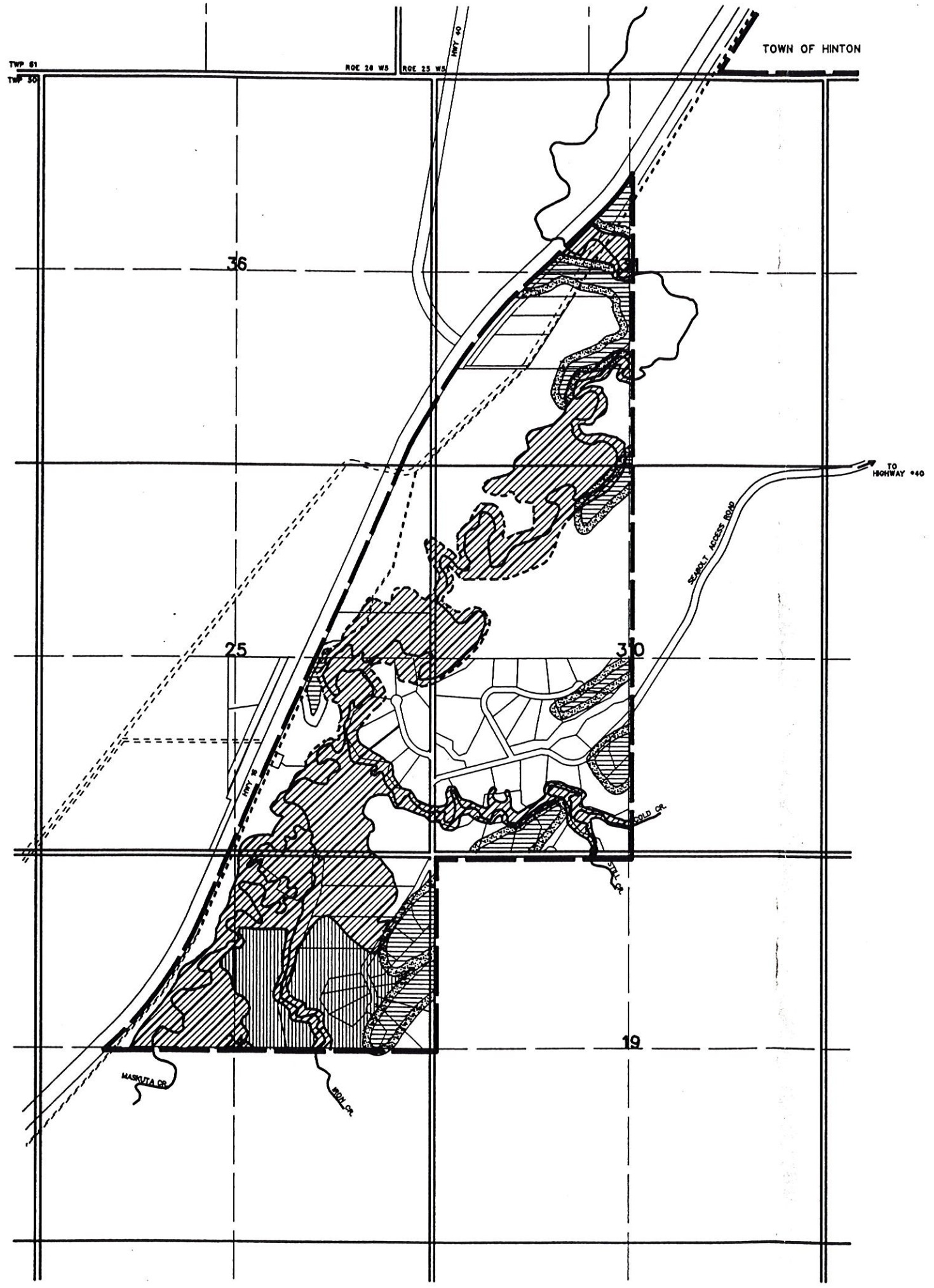
The Land Use Order prohibits development on lands that may be subject to flooding. The Land Use Order also defines "floodplains" as the area affected by the 1:100 year flood event. Figure 4 shows the 1:100 year floodplains for Maskuta, Iron, and Cold Creeks as they affect the plan area. No substantial permanent development should occur within this area.

Again, lands which are not part of the normal creek bed or bank, but are included within the 1:100 year floodplain, maybe incorporated into future subdivisions. However, each lot must include a developable building site not affected by the development constraints shown in Figure 4.

For a description of the method employed in the definition of the 1:100 year floodplain, please see Appendix A.

4.3 Soils

The Resource Inventory and Land Use Evaluation of the Hinton-Jasper Corridor identifies areas within the Seabolt Plan area which are subject to development constraints related to soils. Very Severe to Severe limitations for permanent buildings (with or without basements) and for septic fields occur in the vicinity of Maskuta and Cold Creeks. These limitations are based on a combination of factors including the area's susceptibility to flooding and the permeability of the soils which consist of a combination of sand and gravel.



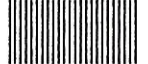


TOWN OF HINTON

SEABOLT RIDGE

AREA STRUCTURE PLAN

I.D. OF YELLOWHEAD NO. 14

-  SLOPES > 30% WITH 30m SETBACK
-  FLOODPLAIN
-  RESTRICTED DEVELOPMENT



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DEVELOPMENT CONSTRAINTS

The area generally between Maskuta Creek and Highway 16 is rated as having Severe limitations for septic fields. However, the Resource Inventory acknowledges that Severe limitations do not necessarily preclude the use of septic fields, but only indicate that more stringent than usual installation specifications must be applied.

At the southern edge of the plan area, between Maskuta and Iron Creeks, high water table conditions exist. As a result, the Resource Inventory rates this area as having very Severe limitations for permanent buildings and septic fields.

Constraints on development resulting from soil and/or water table conditions are discussed further in Appendix B. The development policies in Section 5.4 of this plan are based on the conclusions and recommendations contained in Appendix B.

4.4 Water Supply

Areas not subject to prohibitive development constraints were analyzed further, as described in Appendix B, with respect to potable water supply. The quality and quantity of groundwater suggests that areas in which development can otherwise occur are also capable of supporting the maximum intensity of residential development permitted under the Land Use Order. An adequate supply of water appears to be generally available from deep wells (in bedrock aquifers) and may also be available from shallower wells (in gravel aquifers).

4.5 Restricted Development

The area designated "Restricted Development" in Figure 4 is subject to inundation under certain conditions as described in Appendix A. It is also subject to soils and near surface water table constraints. Those conditions do not necessarily preclude country residential development. However, such development should only occur in accordance with site specific controls based on detailed engineering analyses (see Section 5.4 Development Policies).

5.0 DEVELOPMENT CONCEPT

5.1 Land Use

Proposed land use within the plan area is depicted in Figure 5 Development Concept. It consists of two types of use:

- Rural recreational for the area generally west of Iron and Maskuta Creeks in Section 24 and SE 25-50-25-W5; and
- Country residential for the remainder of the plan area.

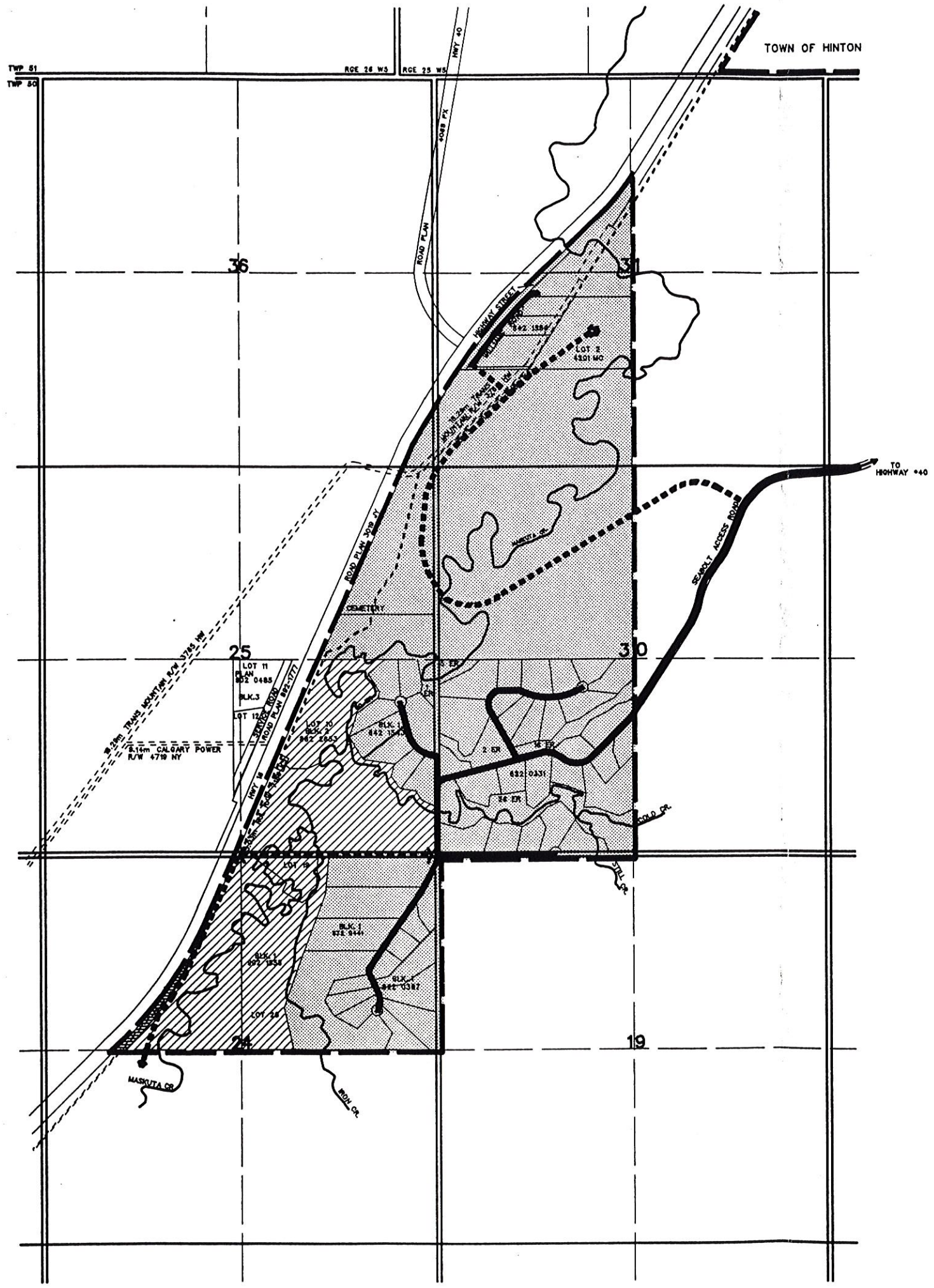
Development in both these areas is subject to the development policies identified in Sub Section 5.5 of this plan.

These designations are based, in part, on the development aspirations expressed by land owners in the area. The identification of an area for rural recreational development adjacent to Highway 16 is consistent with the provisions of the ID 14 GMP and the Hinton-Jasper Corridor Study. The Seabolt area offers an opportunity for the development of tourism related facilities in a location which is highly accessible and visible, and yet is not subject to prohibitive environmental constraints.

The designation of the remainder of the plan area for country residential development acknowledges the character of existing development and the need to protect it from incompatible development. This designation is not the direct equivalent of the Country Residential Restricted District contained in the Land Use Order. Areas which, based on the development policies in Section 5.4 of this plan or on other regulations, cannot be included in residential lots may have a Forestry or Agricultural District applied under the Land Use Order. These districts would still be regarded as consistent with the general Country Residential designation imposed by this plan.







5.2 Circulation

The development concept describes an internal circulation network which responds to two fundamental concerns related to access in the Seabolt area. In order to accommodate long term highway plans, alternate access for the properties which currently rely upon highway access must be identified and protected. Alternate access may be by means of a service road or a back road system. The planned circulation system provides for the eventual construction of a service road adjacent to the east side of Highway 16, south of Section 25. The service road will connect to Highway 16 at the airport road intersection south of the plan area.



SEABOLT RIDGE AREA STRUCTURE PLAN

I.D. OF YELLOWHEAD NO. 14

-  EMERGENCY ACCESS
-  EXISTING ROAD
-  FUTURE ROAD
-  RURAL RECREATION
-  COUNTRY RESIDENTIAL
-  ROAD WIDENING



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DEVELOPMENT
CONCEPT

The second basic concern is that the Seabolt access road and the internal Seabolt circulation system are, at present, a long cul-de-sac which could potentially serve as many as 110 residential lots. No alternative road access is currently available. The plan therefore calls for the construction of an emergency access along the government road allowance between Sections 24 and 25 west from the existing road to a point just east of Iron Creek. Until such time as the service road described above is constructed, the emergency access would connect to the internal circulation system within the Bar F Ranch development. This emergency access would be equipped with knock down posts or a gate which would allow for maintenance and snow removal as well as limiting use of the route to emergencies only. The specific provisions of an agreement with the affected land owner with respect to compensation, maintenance, etc. would be negotiated as part of the development agreement for the lands affected.

When the service road from the plan area south to the Airport Road/Highway 16 intersection is constructed, the interim emergency access through the Bar F lands would no longer be required. However, the emergency access would still be maintained between the country residential circulation network and the service road.

When and if direct access to Highway 16 is eliminated in the northern portion of the plan area, some alternative access will be required for existing and future country residential development in this portion of the plan area. The circulation network shown in Figure 5 provides for the extension of a local road from the Seabolt access road through NE 30 to NW 30. From there, it will connect to existing roads in the north portion of the plan area. As a result of this connection the development for country residential use of portions of NE 30 would become possible, subject to the claims of current interest holders in this Crown owned quarter section.

However, before this option is implemented, the ID will investigate the feasibility of providing the required access in an alignment which parallels Highway 16 to the north of the plan area. Such an alignment would cross Maskuta Creek to the Highway 40/Highway 16 intersection. If this alignment proves preferable, it is to be used instead of the alignment shown in Figure 5 and discussed above.

5.3 Population

Assuming that the most intense country residential development permissible under the Land Use Order occurs on all lands within the plan area which are not subject to the development constraints discussed in Section 4.0, the total number of residential units in the Seabolt area would be unlikely to exceed 110. Assuming a per unit population density of 2.5, a maximum total population of 275 people is implied. This figure, however, must be regarded as an extremely rough estimate in the absence of specific demographic statistics describing the existing population in the Seabolt area.

5.4 Development Policies

1. Each application for subdivision or a major development permit will be reviewed by Alberta Culture to determine whether or not an historical or paleontological resources assessment is required.
2. Where subdivision for country residential purposes is consistent with the provisions of this plan and the Land Use Order, the land use designation used will be the CRR-Country Residential Restricted District described in Section 65 of the Land Use Order.
3. It is not intended that the Land Use Order be amended to render existing country residential development within the rural recreational area non-conforming. However, no additional country residential development will be approved in the rural recreational area, except where it is accessory to a rural recreational use.
4. The potential visual and auditory impact of rural recreational development in the west portion of the plan on the existing and future country residential development should be minimized. Applications for rural recreational development will be required to describe specific measures taken to minimize any such negative visual and auditory impact. Such measures should include the provision of buffer strips and/or the development of rural recreational uses which will have a minimal negative impact on adjacent residential uses.
5. Where subdivision would otherwise be approvable, it will be permitted within 30 m of the top-of-bank as defined by the subdivision approving authority in consultation with the ID of Yellowhead. Each lot must, however, include an area, not subject to the 1:100 year floodplain, large enough to accommodate the proposed land use. This area must be directly accessible to a developed public roadway without crossing the 1:100 year floodplain.
6. Land within 30 m of slopes exceeding 30% may be included in private lots, but each lot must contain an adequate building site not subject to this restriction.
7. Each applicant for subdivision approval or for a development permit should be informed by the ID of Yellowhead of the high degree of hazard of wind erosion in the plan area. Developers and residents alike should be encouraged to retain vegetation, particularly ground cover, in order to minimize wind erosion.
8. The ID of Yellowhead will not support the subdivision of land for country residential or rural recreational use, and will not issue a development permit for such use, until it is satisfied that an adequate supply of potable water is available to serve the proposed development.

9. The ID of Yellowhead will require the provision of pump out septic tanks for any development unless it, in consultation with Alberta Labour and Public Health authorities, is satisfied that the use of tile fields will not result in a danger to public health.
10. No development will be approved in the area designated "Restricted Development" in Figure 4 unless the ID of Yellowhead, in consultation with Alberta Environment, is satisfied that habitable buildings are designed to withstand the possible inundation described in Appendix A. In addition, the requirements expressed in development policy 9 must be satisfied for each individual building site.
11. The ID of Yellowhead, in consultation with Alberta Environment, will consider revisions to the 1:100 year floodplains shown in this plan based on remedial or mitigative measures to be designed by a qualified engineer and constructed at the cost of the proponent. Adjustments will also be considered by the ID, in consultation with Alberta Environment, on the basis of additional information and analysis submitted by a qualified engineer on behalf of the proponent.
12. The ID of Yellowhead will regulate development, through the Land Use Order, to minimize the removal of trees and other vegetation.
13. No habitable residential building shall be permitted within 5.0 m of the Trans Mountain Pipeline right-of-way, or any future high vapour pressure petroleum products pipeline right-of-way.
14. The ID of Yellowhead will request the proponent of any proposal to clear-cut treed areas within Maskuta, Iron, and Cold Creek watersheds to demonstrate the impact on the floodplain levels and limits within the Seabolt Area Structure Plan and implement appropriate mitigative measures as required.

6.0 COMMUNITY SERVICES

6.1 Commercial

In order to preserve the rural character of the Seabolt residential area, the development concept does not include provision for commercial development of any kind within the residential area. Similarly, commercial development will not be permitted adjacent to Highway 16 except to the extent that it may be integrated with and serve rural recreational development in that area (eg. a gift shop at a resort). This restriction is consistent with the provisions of the various background and policy documents discussed in Section 2.0.

Given the proximity of the Seabolt area to the Town of Hinton, and the fact that the majority of residents are and will be employed there, it is expected that residents will look to the Town to provide commercial services.

6.2 Waste Disposal

The municipality does not propose to establish a waste collection facility within the Seabolt area. A regional landfill site exists a short distance south on Highway 40. Residents will continue to transport their waste to this location where it will be accepted by the Hinton Regional Waste Management Authority.

6.3 Schools

Detailed information on demographics in the Seabolt area is not available. However, the area is not expected to generate a large number of students per household. Assuming complete development of the existing and proposed country residential lots, a total of approximately 110 units would be created. This level of student population would not justify the provision of school facilities of any kind within the Seabolt area. It is therefore intended that students from Seabolt would continue to be bussed to existing schools in the Town of Hinton. Discussions with the Yellowhead School Division and the Hinton Roman Catholic Separate School District indicate that excess school capacity to accommodate student generation from Seabolt exists in Mountain View School (K-7), with some additional capacity in the Roche Miette (1-7) and Crescent Valley (K-7) schools. Harry Collinge High School, which now accommodates both public and separate system students, has recently been expanded. In addition, a new junior/senior high school for the separate system is planned for completion in 1994. It will absorb the separate system students currently attending Harry Collinge High School. This additional facility will also mean that Gerard Redmond Community Catholic School (K-9) will have excess capacity to accommodate separate system students from the Seabolt area.

6.4 Parks and Recreation

Consistent with the rural character of the Seabolt area, and its general demographic characteristics, no need for formal park facilities in addition to the substantial areas of natural open space has been identified. Further, given the proximity of the Seabolt area to the Town of Hinton, identification of a potential location for a community hall or other recreation/cultural facility is not regarded as necessary.

6.5 Fire Protection

Fire protection is currently provided by the Improvement District and the provincial department of Forestry, Lands, and Wildlife. The ID is equipped to deal mainly with fires involving structures, while Forestry, Lands, and Wildlife Resources are directed mainly toward wildfire. These two organizations are currently in the process of coordinating their efforts by preparing joint "suppression plans". These efforts should improve the level of fire protection available to residents of the Seabolt Area.

There are, however, two measures which should be considered to further improve fire protection in the area. The first of these involves the construction and maintenance of a water reservoir from which water would be trucked to the site of a fire. A location central to the Seabolt area, accessible to all portions of the plan area, would be preferred. Water for the reservoir could be obtained from the Cold and/or Maskuta Creeks or from a well.

The second measure to be considered is the establishment of a fuel free border to the plan area to inhibit the spread of wildfire. The Highway 16 and Highway 40 rights-of-way serve this purpose to the west, north, and east. Although the prevailing winds are from the southwest, the southwest corner of the plan area is essentially treeless, substantially reducing the fire hazard from that direction. The greatest fire danger exists in the southeast corner of the plan area because there is no clearly defined fuel free border at this location.

**TECHNICAL
APPENDIX A**

**Hydrological Assessment
1 in 100 year Floodplain Mapping**

INTRODUCTION

The intent of this Technical Appendix is to delineate the 1:100 year floodplain adjacent to the watercourses within the Seabolt Area Structure Plan. This assessment addresses the floodplain adjacent to the following creeks within the study area:

- 1) Maskuta Creek;
- 2) Cold Creek; and
- 3) Iron Creek.

APPROACH

The following tasks were completed to delineate the 1:100 year floodplain:

- 1) Determine the 1:100 year creek flows;
- 2) Review the existing survey data and analyses;
- 3) Interpolate the creek cross-sections from existing survey data and contours;
- 4) Conduct the hydraulic analyses using the HEC 2 computer program;
- 5) Perform a sensitivity analysis to determine the impact of increased flows on the flood levels and the associated floodplain limits;
- 6) Delineate the 1:100 year floodplain; and
- 7) Highlight areas subject to inundation due to downstream blockage.

ANALYSIS

Hydrology

The following hydrologic and hydraulic analyses were reviewed to determine the flows in Maskuta, Cold, and Iron Creeks:

- 1) Alberta Environment, Hydrology Branch for River Engineering Branch, Flood Frequency Analysis Maskuta Creek at SW 25-50-26-W5, April 1984;
- 2) UMA Engineering Ltd. for 294745 Alberta Ltd., Subdivision Application Brief to: Yellowhead Regional Planning Commission re: Proposed Subdivision of PTS. SW 31-50-25-5 & SE 36-50-26-5 Improvement District of Yellowhead No. 14, Alberta, December, 1989;
- 3) Bolter Parish Trimble Ltd., Hydrology and Physiography of Proposed Development Along Cold Creek Near Hinton, August, 1979.
- 4) Alberta Environment River Engineering Branch, HEC 2 Analyses Maskuta Creek at NW-24-50-26-W5M, 1984.
- 5) Alberta Environment River Engineering Branch, HEC 2 Analyses Maskuta Creek at SE-25-50-26-W5M, 1990.
- 6) Alberta Environment Design and Construction Division, Maskuta Creek at Hinton Channel Profile, 1979.

The flows determined in these reports and analyses were used as a basis for the 1:100 year flows in the three creeks within the study area. No streamflow records exist for any of the three creeks within the study area. The Hydrology Branch report for Maskuta Creek at SE-25-50-26-W5M (Ref. 1) used streamflow records from Eunice Creek (a gauged creek near Hinton with 16 years of streamflow data) and adjusted the flows for the Maskuta Creek drainage basin. The UMA Engineering report (Ref. 2) prorated the Hydrology Branch Maskuta

Creek flows to determine the 1:100 year flows for the drainage basin area at SW 31-50-25-5 & SE 36-50-26-5. The Bolter Parish Trimble report (Ref. 3) used a similar approach of prorating flows from other drainage basins to determine the 1:100 year Cold Creek flows. The streamflow data from Eunice Creek was reviewed to see if the data gathered since the original report was written (1984) impacted on the previously determined values. We could see no need to adjust the 1:100 year flows and existing flow data was used wherever possible to ensure consistency with previous analyses.

Additional information about clear-cut logging proposals in the Seabolt area was received during the public meeting to review the preliminary draft plan. An increase in runoff and higher streamflows can be expected should treed areas within the Maskuta, Iron, and Cold Creek watersheds be clear cut. The impacts of clear cutting on the streamflows was not considered as the extent of potential clear cut areas has not been defined.

As shown on Figure A1, Maskuta Creek was divided into six reaches, based on existing streamflows and available survey data. The Iron and Cold Creek flows were determined for the entire length of these creeks within study area. The method used by the UMA Engineering report, Ref. 2, was used to prorate the streamflows over the various drainage basin areas. An example of this method (used to calculate the flows for Reach 4) is shown as follows:

Reach 6 Drainage Basin Area = 116 km²
 Reach 4 Drainage Basin Area = 126 km²

Reach 4 1:100 Year Streamflow = 87.3 m³/s Alberta Env., Ref.1

Flow/Area Relationship:

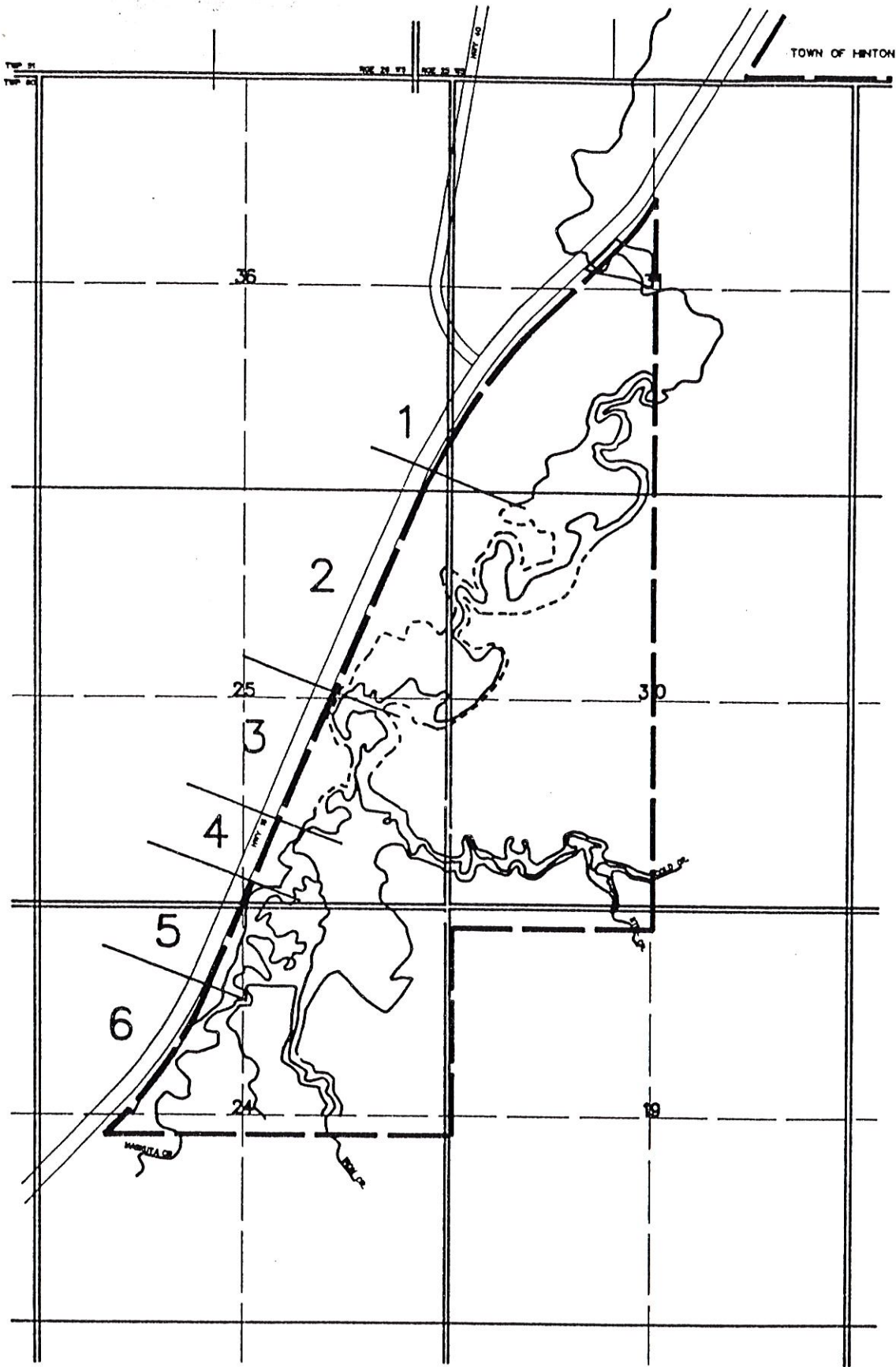
$$Q_2 = Q_1 * (A_2 / A_1)^n \quad n = 0.75 \quad \text{UMA Engineering, Ref. 2}$$

$$Q_2 = 87.3 * (126 / 116)^{0.75}$$

$$Q_2 = 92.95 \text{ m}^3/\text{s}$$

The 1:100 year streamflows and critical drainage basin areas are shown in Table 1.

Table 1		1:100 Year Streamflows	
Creek	Drainage Area (km ²)	Streamflow (m ³ /s)	Comments
Maskuta Creek			
Reach 1	172	120	Ref. 2
Reach 2		120	Downstream of Cold Creek
Reach 3		120	Downstream of Cold Creek
Reach 4	126	92.95	Downstream of Iron Creek
Reach 5		87.3	Ref. 1,5
Reach 6	116	87.3	Ref. 4
Iron Creek	7.2	10.88	
Cold Creek	49.5	52.4	Ref. 3



SEABOLT
 RIDGE
 AREA STRUCTURE PLAN

MASKUTA CREEK
 FLOOD PLAIN
 REACHES

I.D. OF YELLOWHEAD NO. 14



A-1

Creek Cross Sections

The following survey data was reviewed to determine the cross-sections of Maskuta, Cold, and Iron Creeks for use in the HEC 2 hydraulic analyses:

- 1) Maskuta Creek Reach 1, UMA Engineering - survey cross sections and hydraulic analyses and Alberta Environment Design and Construction Division - cross sections and channel profile;
- 2) Maskuta Creek Reach 4, UMA Engineering - survey cross sections and Alberta Environment River Engineering hydraulic analyses;
- 3) Maskuta Creek Reach 6, Alberta Transportation - survey cross sections and Alberta Environment River Engineering hydraulic analyses;
- 4) Cold Creek, Bolter Parish Trimble - bridge cross section, hydraulic analyses and floodplain; and
- 5) Iron Creek, UMA Engineering - survey cross sections.

Creek cross-sections for the reaches where no survey data was available were interpolated from contours and the existing channel characteristics.

Hydraulic Analyses

The hydraulic characteristics of each creek section were determined for use in the HEC 2 channel computer model, based on guidelines from Design of Small Dams, Ref.7. The Manning's n for the channel bed was estimated at 0.04, as the channel bed is gravel. The Manning's n for the overbank area was estimated at 0.14 for the majority of the reaches, based on the channel irregularity, meander, obstructions, and vegetation. The Manning's n for the overbank areas in Reaches 1, 2 and 3 of Maskuta Creek were estimated at 0.21 because of the denser overbank tree cover in these areas.

Backwater calculations using the 1:100 year flows and the existing and interpolated cross-sections were completed using the HEC 2 computer model. The program was also rerun with the flows increased by fifteen percent (15%) to determine the model's sensitivity to increased flows. The 1:100 year flood levels for the various cross-sections were compared to the available existing hydraulic analyses. The extent of the 1:100 year floodplain was mapped and is shown on Figure 4.

The calculated 1:100 year flood levels generally agreed with the results of previous analyses. It was also found that increasing the flows by fifteen percent (15%) would result in a rise in the flood levels of approximately 0.15 to 0.20 metres. The impact of the higher flows on the horizontal limits of the floodplain was not significant as this difference (0.15 to 0.20 metres) is less than the accuracy of interpolated cross-sections from the survey data.

The analysis and resultant floodplain mapping also showed that certain areas within the Seabolt Area Structure Plan are potentially subject to inundation, should blockage of the downstream watercourse occur. In the event of a blockage, the Maskuta Creek streamflows in N_{1/2} 24-50-26 W5M could overtop the 1:100 year floodplain and extend into the areas highlighted on Figure 4. The frequency of such an event is difficult to predict as it is a function of the nature of the blockage (beaver dams, fallen trees, or ice jam obstructions) and the rate of flow in the upstream channel during the blockage. We recommend that I.D. No 14 require the proponents of any development within these potentially inundated areas to conduct the engineering analyses and more precise surveys necessary to determine the impact of inundation on their development and submit these reports to I.D. No. 14 and Alberta Environment for evaluation and that their recommendations be made development conditions.

The designation of a floodplain within Reach 2 of Maskuta Creek has a high potential for error, based on present information. The water level and the associated floodplain within Reach 3 of Maskuta Creek is quite sensitive to the interpolated channel/floodplain cross-sections.

We recommend that I.D. No. 14 require the proponents of any development within all reaches of Maskuta Creek to survey the cross-sections necessary to more precisely determine the 1:100 year flood level and associated floodplain.

CONCLUSIONS

Based on the evaluations described in this appendix, the following conclusions were drawn:

- 1) A 1:100 year floodplain for Maskuta, Cold, and Iron Creeks can be delineated within the Seabolt Area Structure Plan.
- 2) Certain areas beyond the 1:100 year floodplain within the Seabolt Area Structure Plan are potentially subject to inundation, should blockage of the downstream watercourse occur.
- 3) The designation of a floodplain within Reach 2 of Maskuta Creek is very unreliable, based on present information.
- 4) The water level and the associated floodplain within Reach 3 of Maskuta Creek is quite sensitive to the interpolated channel/floodplain cross-sections.
- 5) More precise survey data within all reaches of Maskuta Creek is necessary to confirm the 1:100 year flood level and associated floodplain.
- 6) Potential clear-cut logging of treed areas within the Maskuta, Iron, Cold Creek watersheds would affect the streamflows and corresponding floodplain levels and limits within the Seabolt Area Structure Plan.

RECOMMENDATIONS

Based on the evaluations conducted and the conclusions drawn, we recommend the following:

- 1) I.D. No 14 require the proponents of any development within potentially inundated areas to conduct the engineering analyses necessary to determine the impact of inundation on their development and submit these reports to I.D. No. 14 and Alberta Environment for evaluation and that their recommendations be made development conditions.
- 2) I.D. No. 14 require the proponents of any development within all reaches of Maskuta Creek to survey the cross-sections necessary to more precisely determine the 1:100 year flood level and associated floodplain.
- 3) ID No. 14 require the proponent of any proposal to clear-cut log treed areas within the Maskuta, Iron, and Cold Creek watersheds to demonstrate the impact on floodplain levels and limits within the Seabolt Area Structure Plan and implement appropriate mitigative measures as required.

REFERENCES

1. Alberta Environment, Hydrology Branch for River Engineering Branch, Flood Frequency Analysis Maskuta Creek at SW 25-50-26-W5, April 1984.
2. UMA Engineering Ltd. for 294745 Alberta Ltd., Subdivision Application Brief to Yellowhead Regional Planning Commission re; Proposed Subdivision of PTS. SW 313-50-25-5 & SE 36-50-26-5 Improvement District of Yellowhead No. 14, Alberta, December, 1989.
3. Bolter Parish Trimble Ltd., Hydrology and Physiography of Proposed Development Along Cold Creek Near Hinton, August, 1979.
4. Alberta Environment River Engineering Branch, HEC 2 Analyses Maskuta Creek at NW-24-50-26-W5M, 1984.
5. Alberta Environment River Engineering Branch, HEC 2 Analyses Maskuta Creek at SE-25-50-26-W5M, 1990.
6. Alberta Environment Design and Construction Division, Maskuta Creek at Hinton Channel Profile, 1979.
7. United States Department of the Interior, Bureau of Reclamation, Design of Small Dams, 1974.

TECHNICAL

APPENDIX B

Hydrogeological/Geotechnical Assessment

Groundwater Supply

Near Surface Water Table

Sewage Disposal Suitability

INTRODUCTION

The intent of this Technical Appendix is to evaluate the hydrogeological/geotechnical conditions of the lands within the Seabolt Area Structure Plan and to assess their suitability for further country residential development. This assessment highlights potential development limitations within the study area to assist the I.D. of Yellowhead No. 14. in future development proposal evaluations. Three components were assessed to determine future development suitability, in accordance with Alberta Environment's guidelines for residential subdivisions, (Ref. 1):

1. Groundwater supply;
2. Near surface water table; and
3. Sewage disposal suitability.

These three components were evaluated for the lands within the study area using two criteria:

1. Existing development conditions, and;
2. Potential future development conditions.

Existing Conditions

Four (4) of eight (8) quarter sections within the study area have been subdivided and developed for country residential use. A variety of information exists in support of the previous subdivision applications. This information was provided by I.D. of Yellowhead No. 14 and Alberta Environment Land Use Branch.

Potential Future Development Conditions

The potential future development conditions were based on development proposals, information provided by I.D. of Yellowhead No. 14 and Alberta Environment Land Use Branch, and potential development scenarios developed from the Seabolt Area Structure Plan. The areas where data gaps exist were highlighted for further investigation.

Approach

The information was summarized according to the three components. To understand the impact of each component on development, it is necessary to consider all three components together for each parcel of land. The Alberta Environment guidelines deal with subdivisions on a quarter section basis. The majority of the land holdings considered are entire quarter sections or substantial portions of quarter sections. The development limitations were evaluated for each quarter section to be consistent with Alberta Environment's standards and the land ownership pattern.

GROUNDWATER SUPPLY

The existing groundwater data for the study area and vicinity was obtained from the provincial groundwater data archive maintained by Groundwater Information Services, (Ref. 2). The records examined included:

1. Water Well Driller's reports;
2. Aquifer tests; and
3. Chemical analyses.

These records were supplemented by reports submitted in support of subdivision applications. The additional reports were received from the I.D. of Yellowhead No. 14 and Alberta Environment Land Use Branch. The summary of the groundwater supply results is shown in Table 1.

Generally, for the areas where aquifer tests are available, the groundwater supply is sufficient to support the existing and potentially developable lots outlined in Table 1. The water quantity throughout the study area is somewhat variable, depending on the depth of the well and the type of aquifer. The bedrock aquifers are significantly deeper than the gravel aquifers and generally yield higher long term supply rates.

The potentially developable lots shown in Table 1 were calculated on the basis of the maximum density consistent with the provisions of the Seabolt Area Structure Plan with respect to the floodplain areas and the areas with slopes greater than thirty percent (30%). Although there may be other development limitations (high near surface water table and soil conditions unsuitable for private sewage disposal), the maximum area was used to determine design flowrates for domestic consumption.

The aquifer yields for some of the land parcels outlined in Table 1 have been adjusted from the rates calculated in the corresponding reports. These yields were adjusted because the pumping rates used in the aquifer test were significantly less than the calculated aquifer yield. Alberta Environment standards, (Ref. 1) require that the pumping rate at which the test is conducted should be as great or greater than the theoretical 20-year yield which is required to supply the subdivision. Calculated theoretical 20-year yields which are significantly greater than the pumping rate maintained during the aquifer test are considered unreliable by Alberta Environment. In these cases, the calculated theoretical 20-year yields were adjusted to the pumping test rate.

The quality of the water is generally good, although the water is fairly hard and has a high iron content in some of the wells.

It does not appear that groundwater supply (either quantity or quality) will be a constraint to further country residential development. A review of the existing data and the fact that wells are supplying the existing lots suggest that the aquifers that have been tested will have sufficient capacity to supply potential domestic demands for the lands developed to country residential standards. Reports were not available to assess the groundwater supply possibilities for all quarter sections. We recommend that the I.D. require the proponent of any future development in these areas to conduct the proper groundwater tests to ensure adequate supply, in accordance with Alberta Environment's standards (Ref. 1).

No provision was made in the study to examine the irrigation requirements for the proposed golf course. As the irrigation demands can be significantly greater than domestic requirements, we recommend that I.D. No. 14 require the proponent of the golf course development to conduct the proper engineering analyses required to service the property for the proposed uses and that I.D. No. 14 and Alberta Environment would review these analyses on a site specific basis.

Table 1 Groundwater Supply

1/4 Section	Report Quality Y/N	Lots Exg. Pot.	Domestic Cons. I/day/lot	Design Flow I/sec	Aquifer Yield		Apparent Surplus Capacity I/s	Range of Water Well Driller Report Results Igpm		Comments
					Q 20 Igpm	Q 20 I/s		Low	High	
NE 24-50-26 W5M	Y	11	1,091	0.278	12	0.909	0.631	2	100	Adjusted Q 20 from 39 Igpm to 12 Igpm (pump test rate)
NW 24-50-26 W5M	N	0	1,091	0.000	N/A	0.000	0.000	N/A	N/A	Proposed Golf Course: No Domestic Requirements; Irrigation requirements not considered.
SE 25-50-26 W5M	Y	8	1,091	0.177	0.2	0.015	(0.162)	30	30	Bar F Subdivision 1982 Geoscience Report; Proposed Resort Complex Not Included
SE 25-50-26 W5M	N	0	1,091	0.177	22	1.667	1.490	30	30	Bronson Subdivision: No report available; used values from SW-30-50-25 W5M 1976 Report in subdivision application
SW 30-50-25 W5M	Y	27	1,091	0.341	14	1.061	0.720	9	50	Styline Developments Geoscience Report 1981 Original 1976 Geoscience report (Q20=23 Igpm); well actually in SW-31-50-25 W5M
NE 25-50-26 W5M	N	0	1,091	0.126	N/A	0.000	N/A	8	N/A	No report exists to address water supply
NW 30-50-25 W5M	N	0	1,091	0.164	N/A	0.000	N/A	N/A	N/A	No report exists to address water supply
W1/2 31-50-25 W5M	Pending	4	1,091	0.240	9.5	0.720	0.480	20	40	9.5 Igpm based on driller's pumping rate adjusted Q 20 from UMA calculations
SW 31-50-25 W5M	Y	0	1,091	0.240	23	1.743	1.503	20	40	Geoscience Report 1976 Used for SW-30-50-25-W5M
SE 36-50-26 W5M	N	0	1,091	0.240	23	1.743	1.503	20	40	Included with W1/2 31-50-25 W5M
TOTAL LOTS:		50	55							

* Maximum potential lots may not be realized due to other development constraints

NEAR SURFACE WATER TABLE

The reports submitted in support of existing development proposals, made available from the I.D. of Yellowhead No. 14 and Alberta Environment Land Use Branch, were used to establish development limitations for the various quarter sections within the study area. The presence of a near surface water table (less than 2.1 metres from the surface, Ref. 1) can:

1. Adversely affect the functioning of a sewage treatment system, which could lead to shallow groundwater and/or surface water contamination; and
2. Render the area unsuitable for normal residential development.

The presence of a near surface water table is established by drilling testholes on the subject property and monitoring the water levels according to Alberta Environment standards.

The majority of the reports within the study area (as shown on Table 2) establish that the near surface water table is extremely variable and site specific.

Reports were not available to identify the presence of a near surface water table for all quarter sections. We recommend that the I.D. require the proponent of any future development in these areas to conduct the proper investigations to determine the water table location.

Table 2 Near Surface Water Table

1/4 Section	Report Y/N	Water Table Testholes Completed	High Water Table Present	Comments
NE 24-50-26 W5M	Y	8	Y	Pedology Consultants Report (1979) identified severe development limitations
	Y	8	Y	J.R. Paine Letter Report/Alta Env. Review
NW 24-50-26 W5M	N	N/A	N/A	Proposed Golf Course
SE 25-50-26 W5M	Y	11	Y	Geoscience 1982 Report reports variable high surface water table
SW 30-50-25 W5M	Y	11	Y	Geoscience 1976 Report reports variable high surface water table in 3 of 11 testholes
	Y	12	Y	Pedology Consultants 1979 identified severe development limitations; 4 of 12 testholes reported near surface water table
NE 25-50-26 W5M	N	N/A	N/A	No report exists to address near surface water table
NW 30-50-25 W5M	N	N/A	N/A	No report exists to address near surface water table
NW 31-50-25 W5M	N	N/A	N/A	No report exists to address near surface water table
SW 31-50-25 W5M	Y	4	N	UMA Engineering 1989 report identified no limitations based on near surface water table
SE 36-50-26 W5M	N	N/A	N/A	Included in SW-31-50-25 W5M Application

SEWAGE DISPOSAL SUITABILITY

The reports submitted in support of existing development proposals, made available from the I.D. of Yellowhead No. 14 and Alberta Environment Land Use Branch, were used to establish the suitability of the various quarter sections within the study area for private sewage disposal systems.

The majority of the soil types within the study area (as shown on Table 3) will not support septic tank and field systems for private sewage disposal.

Generally, soils with moderate permeability and low water table conditions are ideal for sewage effluent treatment. Private sewage disposal systems usually consist of a sewage tank (for solids settlement) and a septic field for sewage tank effluent treatment. The presence of a near surface water table and/or soils of extremely high or low permeability (Ref. 1) preclude the use of septic fields. Soils with low permeability (nearly impermeable) tend to become saturated with wastewater, causing a reduction in the breakdown of wastewater, with a corresponding danger to health. In soils with high permeability, there is inadequate contact time between the wastewater and the soil for treatment by biological degradation and adsorption, resulting in shallow groundwater contamination.

Sewage tanks without septic fields can be used in the cases where conditions are not acceptable for septic fields but the tanks must be pumped out to dispose of the effluent. These pump-out systems are not as desirable as the septic field systems because the sewage tanks need to be pumped out on a regular basis and the municipal authority has little control over where the suction truck operators dispose of the effluent.

The typical method for determining a property's suitability for septic field treatment is to conduct percolation tests in conjunction with the near surface water table tests (Ref. 1). The same testholes are normally used for both cases.

The Alberta Department of Labour representative in Edson, Mr. Bernie Proust, was contacted to discuss the private sewage disposal system operation within the study area. According to Mr. Proust, there was no way of determining which of the lots used septic field systems and which used sewage pump-out tanks. In fact, Mr. Proust also expected that most, if not all, of the systems used septic fields, even though some of the development proposals did not allow for their operation.

We recommend that the I.D. not allow septic field systems to be used within new developments unless site specific analysis demonstrates that septic fields would meet Provincial standards established by Alberta Environment (Ref. 1) and the Department of Labour.

Reports were not available to identify the soil permeability and the resultant sewage disposal suitability for all quarter sections. We recommend that the I.D. require the proponent of any future development in these areas to conduct the proper investigations to determine the soil permeability and the suitability for private sewage disposal systems.

Table 3 Sewage Disposal Suitability

Percolation Tests

1/4 Section	Percolation Report Y/N	Testholes Completed	Septic Fields Acceptable	Comments
NE 24-50-26 W5	Y	N	N	Pedology Consultants Report (1979) identified severe development limitations
	Y	8	N	J.R. Paine Letter Report/Alta Env. Review
NW 24-50-26 W	N	N/A	N/A	Proposed Golf Course
SE 25-50-26 W5	Y	8	Y	Geoscience 1982 Report Results variable high surface water table
SW 30-50-25 W	Y	10	N	Geoscience 1976 Report
	Y	N		Pedology Consultants 1979 identified severe development limitations
NE 25-50-26 W5	N	N/A	N/A	No report exists to address percolation
NW 30-50-25 W	N	N/A	N/A	No report exists to address percolation
NW 31-50-25 W	N	N/A	N/A	No report exists to address percolation
SW 31-50-25 W	Y	8	N	UMA Engineering 1989. Not Acceptable for Septic fields
SE 36-50-26 W5	N	N/A	N/A	Included in SW-31-50-25 W5M Application

LAND PARCELS

The assessment of the hydrogeological/geotechnical conditions of each quarter section are discussed together as the three conditions are interrelated.

NE 24-50-26 W5M

Water quantity appears to be sufficient to supply the domestic requirements for the existing and potential lots outlined in Table 1. A 1981 pumping test analysis, prepared for the development proponent by Groundwater Consultants, Ref. 3, established a twenty year safe yield from the test well which was drilled to 275 feet into bedrock. The twenty year safe aquifer yield was adjusted to the test pumping rate of 12 Igpm, giving a more reliable domestic supply estimate. The well supply, even with the adjusted rate, is sufficient to supply the existing and potential lots. The water well driller's reports (7 out of 8 within the quarter section) appear to confirm that 12 Igpm is conservative, as they outline pumping rates of 10 to over 50 Igpm during drilling. None of these wells had proper aquifer tests to substantiate these rates.

The quality of the water is excellent with low hardness, although the water has a high iron content. While the iron concentrations are classified as "poor", they are well within the limits found throughout Alberta.

A 1979 geological/geotechnical report by Pedology Consultants, Ref. 4, was reviewed to determine near surface water table and private sewage system disposal suitability. The report outlined areas with minimal development limitations. These areas are generally the higher ground in the southeast corner of the quarter section. No percolation tests were completed to establish the sewage disposal suitability. The report outlined severe development limitations in the rest of the quarter section. A 1983 J.R. Paine letter report, Ref. 5., showed that percolation rates would not support the use of septic fields in the areas of proposed development. The water table was also found to be within 2.1 metres of the surface in three (3) of the eight (8) testholes monitored. These reports suggest that future development proposals to subdivide lots west of Ridge Road (which serves the existing lots) should be examined carefully for near surface water table and sewage disposal suitability.

NW 24-50-26 W5M

No record could be found of any reports addressing the three hydrogeological/geotechnical conditions for this quarter section. The latest development proposal for this quarter section outlines a golf course adjacent to the Maskuta Creek floodplain. As this type of development may have a large irrigation requirement and does not fall within country residential subdivision guidelines, the servicing of this quarter section was not considered during this analysis. It was assumed that the proponent of the golf course development would be required to conduct the proper engineering analyses required to service the property for the proposed uses and that I.D. No. 14 and Alberta Environment would review these analyses on a site specific basis.

SE 25-50-26 W5M

Two Geoscience Consulting reports from 1976 and 1982, Ref. 6 and 7., submitted in support of two different subdivision applications, were reviewed to establish the hydrogeological/geotechnical conditions of the property. The 1976 report, submitted in support of the Bronson subdivision, was, in fact, prepared for SW 30-50-25 W5M, the Styline Developments property. This report was not considered in the evaluation of SE 25-50-26 W5M. The 1982 report was used as a basis for the evaluation.

Eight country residential lots have been developed on the property. A proposal has been submitted to I.D. No. 14 to expand the development to include a resort complex. As this type of development does not fall within country residential subdivision guidelines, the servicing of the resort complex was not considered during this analysis. It was assumed that the proponent of the resort development would be required to conduct the proper engineering analyses necessary to service the property for the proposed uses and that I.D. No. 14 and Alberta Environment would review these analyses on a site specific basis.

Water quantity appears to be sufficient to supply the domestic requirements for the existing and potential lots outlined in Table 1. The 1982 Geoscience report, Ref. 7, did not supply an aquifer test but extrapolated aquifer yields from the wells tested on the surrounding properties. The report outlined a range of calculated aquifer yields of 0.5 to 22 Igpm in wells drilled into bedrock. Both gravel and bedrock aquifers are present on the property, according to the Geoscience report, Ref. 7. The water well driller's reports for the surrounding properties appear to confirm that the aquifer yield range of 0.5 to 22 Igpm is reasonable, as the reports outline pumping rates of 50 to over 100 Igpm during drilling. None of these wells had proper aquifer tests to substantiate these rates.

The quality of the well waters in the area is generally good, although the water is fairly hard and has a high iron content in some of the wells.

The Geoscience Consulting report, Ref. 7, established that seven (7) out of ten (10) testholes had a high near surface water table. While lots have been developed on the property, these testhole results indicate that future development may be limited by the near surface water table. We recommend that the I.D. require the proponent of any future development in these areas to conduct the proper investigations to determine the water table location.

Percolation rates established by the Geoscience Consulting report, Ref. 7, indicate that, subject to the near surface water table, the soil type is acceptable for septic tanks and fields for sewage disposal. While this was the only parcel within the study area that appears to support septic fields, the variability of the near surface water table suggests that future development may not be able to use septic fields for sewage disposal. We recommend that proper investigations be conducted to determine private sewage disposal suitability.

SW 30-50-25 W5M

The entire quarter section has been developed with 27 country residential lots. The reports submitted in support of the previous subdivision applications were examined to determine their application to the surrounding properties.

Water quantity appears to be sufficient to supply the domestic requirements for the existing and potential lots outlined in Table 1. Two Geoscience Consulting reports, Ref. 8 and 9, were examined. The aquifer test completed in 1976 established a twenty year safe aquifer yield of 23 Igpm. This test was completed on a well in SW 31-50-25 W5M. The twenty year safe aquifer yield of 14 Igpm established in the 1981 report, Ref. 9, was used to check the domestic supply requirements. The water well driller's reports (16 wells within the quarter section) appear to confirm that 14 Igpm is reasonable, as the reports outline pumping rates of 10 to 50 Igpm during drilling. None of these wells had proper aquifer tests to substantiate these rates.

The 1976 Geoscience Consulting report, Ref. 8, established that three (3) of eleven (11) testholes had water levels within 2.1 metres of the surface. The report outlined variable areas of high near surface water table. A 1979 Pedology Consultants report, Ref. 10, was also reviewed. This report established that four (4) of twelve (12) had water levels within 2.1 metres of the surface. The report also established moderate to severe development limitations for areas within the quarter section.

The 1976 Geoscience Consulting report, Ref. 8., also established that the percolation rates of the testholes were too high to support septic fields. It recommended a closed system of sewage disposal, in which effluent is not released into or on the ground, as the safest method of sewage disposal. The 1979 Pedology Consultants report, Ref. 10, did not have any percolation tests but it did recommend a contained system of sewage disposal.

SW 31-50-25 W5M/PTN SE 36-50-26 W5M

A 1989 subdivision application brief completed by UMA Engineering, Ref. 11, was reviewed to establish the hydrogeological/geotechnical conditions of the property. Both quarter sections were considered together as the subdivision application included a small portion of SE 36-50-26 W5M east of Highway 16.

Water quantity appears to be sufficient to supply the domestic requirements for the existing and potential lots outlined in Table 1. The 1976 Geoscience Consulting report, Ref. 6, submitted in support of a subdivision application in SW 30-50-25 W5M, was also examined as it contained an aquifer test on a well drilled in SW 31-50-25 W5M. The well was drilled to a depth of over 250 feet into bedrock, with a calculated 20 year safe yield of 23 Igpm. The water quality was good. A well has been drilled in conjunction with the 1989 subdivision application but no report has been released to address the aquifer yield or water quality. Preliminary calculations completed by UMA outlined an apparent aquifer yield of 49 Igpm. This was based on a 9.5 Igpm pump test rate. The well supply, even with yield adjusted to the pump test rate of 9.5 Igpm, is sufficient to supply the existing and potential lots. The water well driller's reports (4 of 6 wells within the quarter section) appear to confirm that 9.5 Igpm is reasonable, as the reports outline pumping rates of 20 to 40 Igpm during drilling. None of these wells had proper aquifer tests to substantiate these rates.

Four water table testholes, drilled in support of the subdivision application, establish that there is no evidence of a water table within 3.0 metres of the surface.

The UMA report determined that, based on the water table and the percolation testing, the soil conditions are suitable for private sewage disposal systems. The percolation rates of the eight testholes appear to be more rapid than allowed by Alberta Environment, Ref. 1, for septic field systems.

NE 25-50-26 W5M
NW 30-50-25 W5M
NW 31-50-25 W5M

No record could be found of any reports addressing the three hydrogeological/geotechnical conditions for these quarter sections. The groundwater supply, the near surface water table and the percolation rates for the soils on adjacent properties are variable and no conclusions can be drawn about the development limitations for this property. We recommend that future proponents submit test results and analyses, in accordance with the Alberta Environment standards, Ref. 1 to support any future development proposals within these quarter sections.

CONCLUSIONS

Based on the evaluations described in this appendix, the following conclusions were drawn:

- 1) Reports were not available to assess the groundwater supply possibilities, the presence of a near surface water table, and the soil permeability (and the resultant sewage disposal suitability) for all quarter sections.
- 2) The groundwater supply does not appear to be a constraint to development.
- 3) The quality of the water is generally good, although the water is fairly hard and has a high iron content in some of the wells.
- 4) Both bedrock and gravel aquifers are present within the study area.
- 5) The near surface water table is extremely variable and site specific within the study area.
- 6) The majority of the soil types within the study area will not support septic tank and field systems of private sewage disposal.
- 7) Servicing of the two resort/recreational development proposals (Robson Golf course and the Bar-F resort) within the study area are not within country residential servicing standards.

RECOMMENDATIONS

Based on the evaluations conducted and the conclusions drawn, we recommend the following:

- 1) The I.D. require the proponent of any future development within the study area to conduct the proper groundwater tests to ensure adequate supply.
- 2) The I.D. require the proponent of any future development within the study area to conduct the proper investigations to determine the water table location.
- 3) The I.D. assume that the majority of the soil types within the study area will not support septic tank and field systems of private sewage disposal in evaluating all future development proposals unless site specific analysis demonstrates that septic fields would meet Provincial standards established by Alberta Environment (Ref. 1) and the Department of Labour.
- 4) The I.D. require the proponents of the golf course and resort developments to conduct the proper engineering analyses necessary to service their properties and submit these reports to the I.D. for evaluation and that their recommendations be made development conditions.

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