


McLean Lake Supp. File.
2040-20-WH13 

Prepared for the City of Whitehorse and Government of Yukon

MCLEAN LAKE AREA DEVELOPMENT SCHEME

Draft Final Report

Inukshuk Planning & Development
April 2000



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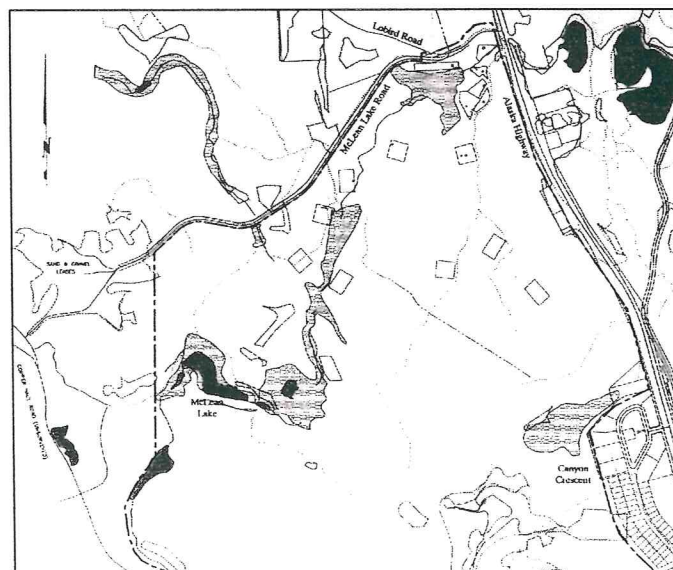
McLean Lake Area Development Scheme Draft Final Report

1.0 Introduction

The McLean Lake Area Development Scheme (ADS) covers approximately 630 hectares and is bounded by the Alaska Highway to the east, the former Whitehorse Copper Mine to the south, McLean Lake Road to the north, and the existing Copper Haul Road to the west. Three options for development were put forward in 1987 ranging in density from urban to country residential standards. No plan was subsequently adopted due to lack of consensus. While the City of Whitehorse is responsible for land use planning within city boundaries, the Government of Yukon owns the land. The existing squatters have been able to acquire their homestead sites resulting in a piecemeal arrangement of lots of varying shapes and sizes.

The 1994 City of Whitehorse Official Community Plan (OCP) has a stated preference for urban residential development in the McLean Lake area. The residents recognise that pressure for further development of this area is inevitable but prefer a country residential standard. They also want to preserve their alternative lifestyle and are concerned that when development occurs, the cost of basic infrastructure improvements not be beyond the means of the existing residents.

The purpose of this ADS is to answer a number of important questions regarding how the McLean Lake area should evolve in future years. It is an important issue given the area's proximity to the centre of Whitehorse and its surrounding land uses.



McLean Lake ADS Study Area

2.0 Situation Analysis

2.1 Area Development History

A number of people have been squatting in the McLean Lake area since the 1970's. Following release of the Government of Yukon Squatters' Policy in 1986, many applied to purchase their home sites. During this same period (1984-85), the original McLean Lake Quarry was planned and a haul road (McLean Lake Road) was constructed to the pit area from the existing Alaska Highway/Lobird intersection. The quarry area was expanded in 1993 and McLean Lake Road connected to the Copper Haul Road.

In the 1980's the Government of Yukon identified this area as a potential future residential area and subsequently initiated the necessary feasibility studies. A 1987 Klohn Leonoff study examined a variety of development options for this area. The City of Whitehorse preferred to see the area protected for future urban residential development and proposed to amend the 1989 Official Community Plan accordingly. Residents of the McLean Lake area objected, citing terrain conditions, access and servicing concerns. They also indicated that a country residential development pattern would be more compatible with their lifestyle and meet market demand. The McLean Lake residents filed an intervention and the Yukon Municipal Board held a public hearing. Nevertheless, the 1994 Official Community Plan designated the eastern half of the area, where most residents live, for eventual urban residential development. This decision is now being re-examined in light of the results of the Copper Mine ADS and recent requests for additional sand and gravel leases.

2.2 Terrain Analysis

Topography and Drainage

Based on data from existing reports prepared by Klohn Leonoff and J.D.Mollard & Associates, the majority of the study area is underlain by rough, intrusive igneous bedrock and covered with a morainal blanket consisting of unsorted glacial till. Throughout most of the site, the thickness of the morainal blanket is greater than 3 m. However, bedrock outcrops and areas with less than 3 m of soil cover have also been identified.

The topography of the site is quite variable. Throughout most of the site, slopes of less than 15% have been mapped. Areas of steep slopes are limited to the perimeter of the central portion of the study area such as the slope overlooking the Alaska Highway along the east side of the site, the banks along both sides of McLean Creek and the bank overlooking the draw which separates the study area from Canyon Crescent.

The McLean Creek watershed covers an area of approximately 19.6 km². The lakes and wetlands in the upper portion of the study area are consistent with a glacial meltwater channel. Streamflow is derived from springs in the upper lake and surficial run-off from the lower slopes of Mt. McIntyre. There is no current baseline information on the hydrogeology and surface discharge characteristics of McLean Creek. The McLean Lake is approximately 56 hectares in size. Organic material has accumulated in fen and marsh wetlands along the channel. The creek cuts through a basalt bed at an elevation of approximately 745 m, forming a striking waterfall and canyon complex.

Below the canyon the creek drains into another marsh complex, then crosses under the Alaska Highway approximately 600 m south of Robert Service Way to feed Hobo Lake. It is believed that Hobo Lake drains underground to Ear Lake, and on, into Schwatka Lake.

McLean Creek has long been a source of potable water for local residents. The Whitehorse Copper ADS proposes to permit industrial and heavy industrial uses around the west and southwest sides of McLean Lake. Given the complex hydrological systems in this area, residents are concerned about protecting watershed source water.

The health of the McLean Lake drainage basin has been identified in a number of other land use studies over the past 10 years. Significant water level fluctuations in Ear Lake have occurred in recent years that can only partly be explained by lower than normal precipitation levels. The City of Whitehorse has been advised to undertake a regional hydrogeological investigation of this watershed but no action has yet been taken.

A second drainage course exists south of the study area, near Canyon Crescent. The natural drainage was altered to create a tailing dam for the Whitehorse Copper Mine. Recent studies completed by Mougeot GeoAnalysis¹ have found this central wetland contains active permafrost and thermokarst activity. Although little in the way of surface drainage is evident beyond the tailings dam, a spring-fed marsh occupies the lower portion of the channel, which is subject to overflow icing in most winter months. The surface discharge of groundwater that creates the icing problem has an indirect benefit to the wetland since these areas melt last. By holding back water, spring run-off rates are stabilised and groundwater recharge is encouraged.

Pockets of similar winter overflow icing are also found in the wetlands along McLean Creek.

Two prominent knolls exist north and east of McLean Creek and are comprised of up to 20 m of coarse gravel and gravelly sand. Steep slopes and large variations in the composition of the gravel deposits are typical of the kame and kettle topography. The knolls rise to over 825 m, and as such, are landmarks clearly visible from the Alaska Highway.

¹ Mougeot GeoAnalysis. 1997. Soil, Terrain and Wetland Survey of the City of Whitehorse. Prepared for Planning Services, City of Whitehorse.

Most of the area is subject to some limitation by the slope of the land, and to a lesser degree, by the occasional presence of near-surface bedrock. Moderate to severe limitations occur along the ridges overlooking the Alaska Highway and Canyon Crescent, as well as along the margins of meltwater channels, kame terraces and in the McLean Creek canyon. Slopes of 8% or less are considered optimal for development, although slopes of up to 15% may be developed at an additional cost for design and construction.

Soils

Surficial material within the area is predominantly unsorted glacial till, with a strong local bedrock influence. In some areas, bedrock may be encountered in outcrops or at shallow depths (<3m) under till, gravel and sand deposits.

The majority of the study area is predominantly well drained, due to positive slopes and granular soils. The wetlands and poorly drained areas correspond with the original meltwater drainage channels along McLean Creek and behind Canyon Crescent.



Shallow bedrock imposes a slight to moderate constraint in site-specific locations. Bedrock outcrops are found at elevations of ~790 m along the crest of this hill as well as ~745 m in the vicinity of the Creek. Geotechnical investigations identified bedrock within 0.6 m of the surface toward the crest of the main hill in the centre of the site.

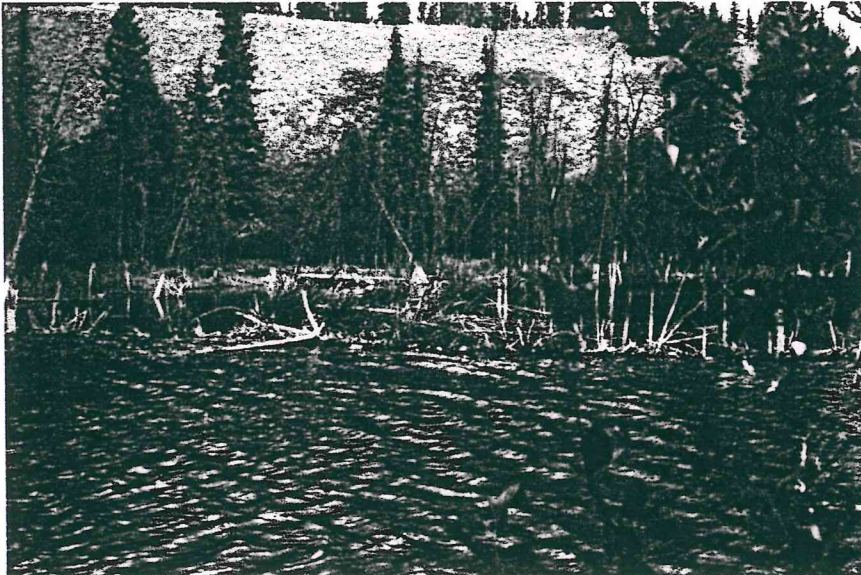
Shallow bedrock and outcrops impose limitations on development.

Shallow bedrock imposes limitations on the installation of underground utilities and septic systems. Shallow groundwater, seasonal flooding, thermokarst and permafrost are present in the wetland areas adjacent to McLean Creek. Encroachment into these areas should be avoided wherever possible and setbacks retained to maintain their environmental integrity.

Vegetation

The vegetation within the McLean Lake study area is boreal forest with a wetland area traversing the north-western boundary. The predominate vegetation along the ridge consists of lodgepole pine (*Pinus contorta*) and trembling aspen (*Populus tremuloides*) on south-facing slopes, and white spruce (*Picea glauca*) in lower areas and on north-facing slopes. The tree cover along the creeks and marshes is predominantly black spruce (*Picea mariana*) and willow (*Salix spp.*). A lack of soil moisture across most of the site restricts plant growth in the McLean Lake area.

The wetland adjacent to and east of McLean Lake resembles other Yukon wetlands that are underlain by permafrost in colder regions. It hosts an assemblage of geomorphological and periglacial features that are considered to be unique or uncommon². The wetlands host large polygons of marl deposits surrounded by raised ridges of peat, many with leaning trees. These are typical indications of permafrost and thermokarst activity. Steep hummocky terrain and active permafrost surround the wetland perimeter. This includes sorted circles comprised of completely unvegetated boulders as well as circles of fine grained sediments referred to as “mud boils”.



The McLean Lake area is habitat for a number of plant and animal species.

In the vicinity of the waterfalls, there is a distinctive microenvironment that hosts a vegetation assemblage indicative of unusually moist conditions. A stand of large mature paper birch (*Betula papyrifera*) and a lush understory of shrubs, herbs and mosses have become established at this site. Paper birch is an uncommon occurrence in the region.³

² Catherine Kennedy Pers. Comm; City of Whitehorse Wetlands Study 1996

³ IBID

In July 1998 botanist Catherine Kennedy examined the vascular plants in the wetlands along McLean Creek. Three species were of particular interest:

- *Scirpus rollandii* – a bulrush that is rare in the Yukon and not previously seen in the Whitehorse area
- *Juncus alpinoarticulatus ssp.americanus* – a bogrush
- *Carex buxbaumii* – a sedge species common to most areas of the continent but not often encountered in Yukon.

There has not been a detailed botanical inventory conducted in the McLean Lake area. With the presence of rare plant species already noted, more detailed study of the McLean Creek corridor at the subdivision planning stage is appropriate. This research should examine the impact of adjacent land use on biodiversity, the types of seasonal recreation activities appropriate (i.e. extent of any trail development) and the types of conservation controls needed (i.e. development setbacks, conservation easements). This information will also be needed to establish a baseline reference point with which to monitor changes.

Fish and Wildlife

The existing wetlands in the McLean Lake area provide avian and mammalian habitat. The McLean Lake area is not critical habitat for any one species but a variety of wildlife is known to pass through or use the area during the year (e.g., moose, black bear, lynx, fox, wolverine, coyote and possibly wolves, as well as beaver, muskrat, otter, porcupine and mink). The Yukon Bird Club uses the McLean Lake area on a regular basis. A wide variety of waterfowl, shore birds and forest birds can be seen throughout the McLean Lake watershed. Avian predators such as the Northern Goshawk have been sighted nesting in the area. Although not included in a recent study⁴ identifying significant wildlife viewing sites within the City of Whitehorse, area residents indicate there are a number of good vantage points from which the main lake and wetlands can be observed. During the past two winters the following tracks were observed: lynx, coyote, moose, snowshoe hare, mink and muskrat.

Hatchery-raised rainbow and cut-throat trout fry were deposited in McLean Lake in the early 1940's and the fishery is highly valued by local fly fishing enthusiasts today. The McLean Lake watershed is one of only two in all of the Yukon that support a self-sustaining rainbow trout population.

⁴ Applied Ecosystem Management Ltd.1998. Whitehorse Wildlife Inventory, Data Compilation and Gap Analysis. Prepared for Yukon Wildlife Viewing Program, Yukon Renewable Resources.

In 1991, a “catch and release” program was established in the area to protect the rainbow trout population from overfishing. Rainbow trout are also vulnerable to alterations in their habitat. Concerns identified by the Fisheries Branch include: the potential for adjacent land use activity to alter water levels or negatively influence water quality in the McLean lakes directly or by impeding surficial and ground water movement into the watershed. Renewable Resources continues to monitor the lakes and has mapped locations of spawning beds in the Upper McLean Lake watershed.



Wetlands and pocket lakes are an integral part of the McLean Lake ecosystem.

There is anecdotal evidence that beaver activity has an influence on creek flow and water levels in Hobo Lake. This has resulted in the periodic destruction of beaver dams and subsequent flooding of the lower wetlands.

One means of protecting this area is to establish setbacks for development. Maintaining the wetlands area and an appropriate buffer would provide an access corridor for wildlife movement and appropriate bird habitat along the wetlands.

Any development that impacts the size or stability of these wetlands will affect the biodiversity and have consequences for the level and type of recreational use. Comments from area residents stress the importance of maintaining the wetlands intact. Disruption of one portion of the wetlands will have impacts on the ecosystem as a whole.

Heritage Resources

No detailed archaeological assessment has been conducted in the McLean Lake area. However, two archaeological sites were identified in the 1991 McLean Lake Quarry Expansion assessment. One archaeological site was discovered on the knoll overlooking McLean Lake from the east and is currently protected by a 30 m setback from quarrying activities. The second site was discovered at the main trail intersection at the west end of the lake. This site has been largely disturbed. Based on the past assessment, it is likely that other knolls or ridges in the area may yield evidence of prehistoric occupation as well.

An archaeological site assessment is to be completed in the McLean Lake area prior to development proceeding.

Fire Management

Wildfire is a continual concern within the boreal forest. The prevailing winds blow along the valley in a north and southerly direction. The tailings ponds for the former Whitehorse Copper Mine provide some protection from the south and the Alaska Highway affords some protection along the eastern boundary. The main areas of risk are from the west and north though the McLean Lake quarry protects a portion of this area. Lawrence Cyr confirms his father undertook horse logging for fuel wood in the 1920's. In 1927 he remembers there was a large forest fire and they continued to harvest fire-killed wood for several years thereafter. There is evidence of past small sawmill activities in the southwest corner of the site but no records could be found of when operations started or ceased.

Although the area was logged and burned 70 years ago, the potential for wildfire risk is increasing as the regenerated forest matures. A forest fuels map will be required at the subdivision stage to determine the present and future post-development risk. The natural forest pattern, stand composition and past disturbance history can be used to map the distribution of forest fuel types and determine the potential risk.

A wildfire risk assessment study should be incorporated into the detailed subdivision design.

2.3 Geotechnical Considerations

EBA Engineering Consultants Ltd. reviewed Klohn Leonoff 1986 work. The 1986 study included a terrain analysis by J.D. Mollard & Associates, the excavation and logging of 31 shallow test pits, completion of five percolation tests and review of local well records provided by Midnight Sun Drilling and area residents. EBA concluded that additional work would be required to confirm suitability for on-site sewage disposal and to confirm percolation rates⁵. Three additional test pits were excavated and percolation tests conducted. The central portion of the site was found to be most suitable for country residential subdivision development. Full serviced lots at urban densities would be significantly more expensive, due to the presence of bedrock outcrops and the amount of grading likely to be required in areas of steeper slope.

EBA also cautions that even within the core area, bedrock outcrops, slope and soil conditions will impose constraints on specific lot development and require attention to detail at the subdivision design stage.

Gartner Lee Limited identified areas of high radon gas concentration in soils within the Whitehorse Copper area. Radon gas is often a natural occurring condition in till soils. EBA placed two radon gas detectors in the homes of two area residents underlain by different soils. Ten large area radon detectors (LARC's) were also placed throughout the study area to determine existing background levels⁶.

EBA concluded the levels of radon recorded are not high enough to pose any risk to development in the McLean Lake area. Nonetheless, the survey indicated the presence of radon in the area and, as such, house construction methods should make provision for restricting radon infiltration into the home.

The two principal methods of excluding radon gas from entering a residence are generally described as follows, with references to specific sections of the 1995 National Building Code of Canada (see Appendix A):

- Sealing the interface between the soil and the occupied space, so far as is reasonably practicable. Sections 9.13 and 9.18 include requirements for soil gas barriers in crawl spaces. Providing control joints to reduce cracking of foundation walls and airtight covers for sump pits are other measures which can help achieve this objective. The requirements provided in Subsection 9.13.7., Soil Gas Control in Walls, Article 9.13.8.1., Soil Gas Barriers, and Article 9.13.8.3., Sealing of the Perimeter and Penetrations, are described in Appendix Notes A-9.13.7 and 9.13.8., and A-9.13.8.1 (2) and (3).

⁵ Geotechnical Evaluation- McLean Lake Area Development Scheme. EBA Engineering, 1998.

⁶ Radon Gas Survey- McLean Lake Area Development Scheme. EBA Engineering, 1998.

- Ensuring that the pressure difference across the soil/space interface is positive (i.e., towards the outside) so that inward soil gas flow through any remaining leaks will be prevented. The requirements provided in Article 9.13.8.2., Providing for Sub-Floor Depressurization, are described in A-9.13.8.2.

2.4 Existing Land Use

Existing land uses in the McLean Lake area include residential, commercial, industrial and recreational use. The majority of land is owned by the Commissioner of the Yukon, however there are a number of privately titled properties within the study boundary. Both the Kwanlin Dun and Ta'an Kwach'an First Nations have land selections within the area. Adjacent land uses to the McLean Lake area include country residential, heavy industrial, highway commercial and quarries.

Residential

Since the 1986 Squatter Policy, residents have been able to make arrangements to make their home-sites legitimate and this has resulted in 23 one-hectare lots. The lots are scattered throughout the area, though the majority live in the eastern portion of the site adjacent to various trails and along Squatters' Road.

There are two other adjacent residential areas. Initially planned as a partially serviced urban subdivision in the 1960's, Canyon Crescent was reconfigured in the early 1990's as a country residential development. It lies just down-slope from the Copper Mine tailings ponds, south of the McLean Lake area. Lobird Trailer Park, a mobile home park, is located northwest of the study area on a former military base.

Commercial

Highway commercial uses lie immediately east of the McLean Lake site, to the north and south, along the Alaska Highway. These include the Hi Country RV Park and Yukon Gardens to the north, Shell Station, Paddlewheel Village, and Whitehorse Riding Stables across the Alaska Highway, and the Philmar RV Service Centre on the west side of the road. Several existing residents have home-based businesses.

Industrial Use and Quarrying

The study area borders on the McLean Lake gravel quarries to the northwest, the South Access/Ear Lake quarries to the northeast and the abandoned Whitehorse Copper Mine to the south. The Copper Mine ADS calls for the McLean Lake quarries to be redeveloped for light industrial uses and the Copper Mine for a combination of light and heavy industrial uses in the future. The Copper Mine ADS calls for buffer zones ranging between 800 and 1,000m between heavy industrial land uses and country residential areas.

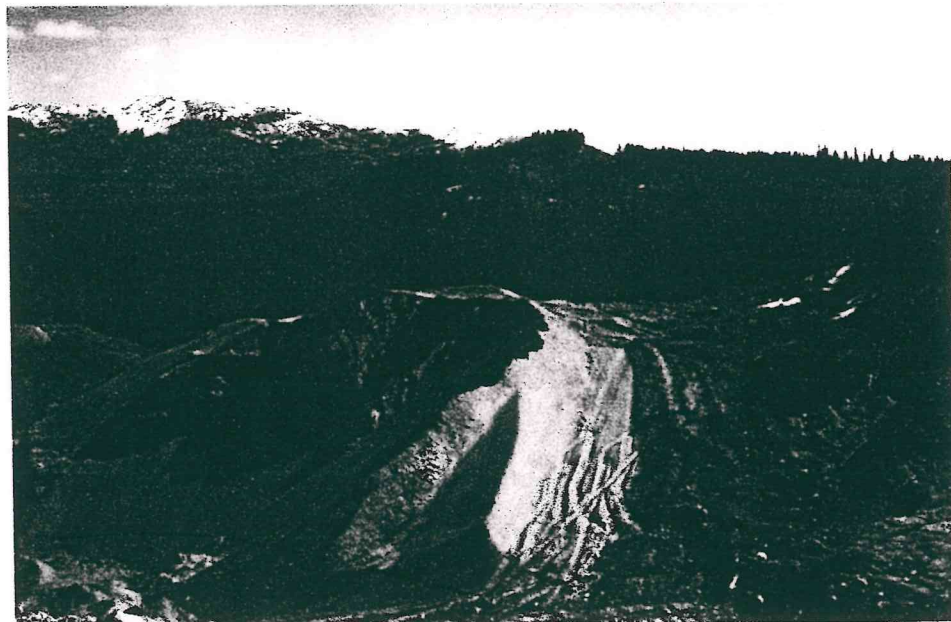
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This separation between industrial and residential uses can be reduced to 200m if the heavy industrial uses are separated from the residential land by light industrial development.

It is also worth noting that the Copper Mine ADS envisions a full range of heavy industrial uses being permitted. These uses could include facilities related to wood processing or reactivation of mining along the Whitehorse Copper Belt. To that end the plan suggests that all industrial traffic be funnelled along the Copper Haul and McLean Lake quarry roads to the Alaska Highway.

Gravel pits are considered to be a heavy industrial use in principle and are recognised as an interim land use with a fixed life span in practice. Two development approaches can be followed. The first is to define the intended end use as has been done in the Copper Mine ADS and ensure the sequential use of the land for extraction does not jeopardise the end use objective. This also implies precedence so the interim land use (gravel quarrying) sterilizes the surrounding area until the resource is exhausted. At this point, buffer requirements and other related land use restrictions are relaxed.

The second approach looks at the ultimate “highest and best use” of land and this takes precedence over the other resource values present. This trade-off option is normally applied where transitional use would compromise the ultimate land use objective such as environmental preservation of the McLean Lake watershed. It generally assumes there are alternate sources for the other resource value – in this case gravel. The problem here is that there are very few alternative gravel sources within the City of Whitehorse and the McLean Lake pits are ideally situated to serve the central portion of the community.



Quarry activity and residential development should be separated by buffer areas.

The extraction potential of the "Sleeping Giant" hill within McLean Lake has been evaluated and there is an application before the City of Whitehorse requesting access to the deposit. In preparing the expansion plans for the existing McLean Lake quarries in the early 1990's, a conscious decision was made not to include this deposit in the quarry plan for two reasons. First, proximity to existing residents and their stated opposition to such a move was known. The City had already indicated its intention to see the McLean Lake area developed for residential purposes and it was recognised that the hill served as an effective visual and noise buffer between the main quarry area and both the existing and future residences.

Maintenance of a buffer between uses has proven to be a prudent move. Other attempts to develop new deposits elsewhere within the city have run into notable public opposition (i.e. Stevens Quarry) [In that situation, the City of Whitehorse chose to protect the gravel resource and drop the country residential component until after the resource has been depleted.]

Most recently, in approving the Copper Mine ADS, Council has accepted the premise that heavy industrial type activities should be separated from residential areas by buffers of 800-1,000m. If applied, this policy decision effectively eliminates residential development within the McLean Lake area until after the existing quarries are closed. The logic for the Copper Mine ADS buffer widths remains unclear.

The "Sleeping Giant" is the highest hill within the McLean Lake area and it is located immediately adjacent to the environmentally sensitive lands designated in the Copper Mine ADS.

Developing the Sleeping Giant deposit will run into significant public opposition and necessitate an amendment to the Copper Mine ADS. The hill is an important gravel source and there is a current application under review.

Recreational/ Open Space

The area possesses an extensive trail network that is used year-round (i.e., skiing, running, mountain biking, walking, picnicking, snowmobiling, fishing and wildlife viewing). The trail system follows a series of horse logging trails and cut roads developed during active exploration of the copper belt. The Copper Haul Road is no longer formally used but is accessible in summer by 4-wheel drive and is a popular snowmobile trail. If new mining activity occurs within the copper belt this road will become a key transportation link. The Copper Mine ADS calls for the Copper Haul Road to be re-opened and upgraded to handle all industrial traffic to the heavy industrial area via the McLean Lake Road. As this has become a well-used trail in its own right, a parallel replacement trail will be needed.

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The individual trails are used to access locations of interest throughout the McLean Lake area. Residents would prefer to see all existing trails protected and incorporated into the subdivision plan. Rerouting some trails or restricting the type of recreational use should be considered to protect wildlife habitat and sensitive wetlands. The small pond immediately downstream of McLean Lake was one location mentioned as being susceptible to severe impacts from motorised traffic, especially snowmobiles in the winter.

The White Horse Riding Stables uses the area for trail riding and feels that future development might negatively impact the trails they presently use. Both the Klondike Snowmobile Association and the trail co-ordinator for the Trans Canada Trail were interested in seeing trail linkages from inside the subdivision to both the McLean Lake and Copper Haul roads for motorised and non-motorised recreation.

Preserving the trail system must balance off the need to protect the lake and adjoining wetlands with the impacts that can accrue from increased use. Trail routing will need to be adapted accordingly.

Implications of Existing Land Use

The McLean Lake residents have consistently indicated a preference for low density, country residential development since the first development proposals were put forward in 1987. Residents questioned the City's desire for an urban development standard on the basis of site character, the environmental sensitivity of the McLean Lake watershed and compatibility with their lifestyle. The City in turn has argued that given the area's relatively central location, the extension of services to this area will eventually be feasible. Thus it makes good sense to use the land as efficiently as possible in the interests of keeping a compact urban form. City Planning staff have also pointed out that it is a common misconception that there is a lot of land suitable for development within City limits.

Current background studies suggest that while an urban development standard is technically feasible, there is merit in many of the concerns put forward by the residents.

The approval of 23 squatter applications on an individual basis without the benefit of an overall land use plan has limited future planning options for several reasons. First, the configuration of parcels along Squatters Road near the Alaska Highway will make it difficult to create an efficient layout and serve both existing and new lots. Second, the location of some parcels in close proximity to the wetlands and waterfall restrict public access and potentially compromise the very environmental protection values all residents have expressed support for. Finally, most of the new parcels assume existing trails will be maintained and upgraded to roads though this may not be the most efficient or logical location.

Limiting the amount of clearing and number of new roads, as well as using buffers and setbacks contribute to design and development that is low-impact and site-sensitive. Residents also want to limit the amount of pollution, avoid development near riparian zones, and control motorised access onto the trails.

From a commercial/business point of view, the McLean Lake area is a prime location, being closer to downtown Whitehorse than Porter Creek and at a key junction between the Alaska Highway and Robert Service Way. The majority of current McLean Lake residents do support small cottage industries (e.g., pottery, blacksmith, artists' studios, agriculture, B&Bs and consulting businesses) as economic opportunities befitting the area.

In 1992 City Council supported the McLean Lake Quarry Expansion on the condition that a minimum environmental setback of 150 m be established from McLean Lake. A 1997 Government of Yukon report indicates there are still areas with mining potential in the copper belt located to the west and south of the McLean Lake study area in the upper reaches of the watershed. Several quartz mineral claims are also located in the southwest corner of the study area and are in good standing.

The large knoll ("Sleeping Giant") north of McLean Lake are a significant local deposit of gravel and the larger knoll to the east has been identified as a potential extension of the McLean Lake Quarry. The City of Whitehorse Official Community Plan states that gravel resources like this should be reserved for eventual future extraction. This option was considered in the 1992 quarry expansion study but dropped because of the potential impacts on fish and wildlife and future residential development within the McLean Lake study area. Currently the bluff provides a visual and noise buffer from the existing quarry operations.

The abandoned Whitehorse Copper Mine and associated tailings ponds are situated immediately south of this study area. DIAND approved Hudson Bay Mining's decommissioning plan and this called for re-vegetating the Whitehorse Copper tailings to prevent wind-blown dust. While some experimental work was done with limited success, no full-scale effort has been undertaken or the condition enforced. The prevailing winds are from the south/south-east, which means dust blows across the tailings area towards the McLean Lake. The Copper Mine ADS calls for this area to be reserved for heavy industry with a setback of 800-1,000 m from the future residential development.

2.5 Vehicular Access and Circulation

There are three main traffic circulation issues. The first issue is the need to provide some sort of internal loop road to facilitate future bus service, balance traffic flows and provide alternative access in case of fire or accident. Excessive length cul-de-sacs have been identified as a problem in the past. The second issue relates to the future function of the Copper Haul and McLean Lake roads.

The Copper Mine ADS envisions these roads providing the main truck access to the industrial area to the south and the light industrial area slated for the reclaimed quarry lands. Unfortunately the study does not appear to have considered how this would work in practice. This same issue is only dealt with indirectly in the more recent *Beyond Copper Ridge Feasibility Study*⁷. The McLean Lake Road was designed as a gravel haul road and intersects the Lobird Road at a 60-degree angle. The Beyond Copper ridge study suggests that Hamilton Boulevard can be extended to connect to the Alaska Highway at Robert Service Way. This would eliminate the existing Lobird/McLean Lake road intersection. However, it will mean 3 main intersections in approximately 700m when access is provided for the new McLean Lake subdivision. To work properly, the McLean Lake haul road also needs to be tied into Robert Service Way with a road link behind the High Country R.V. Park. This would separate the Robert Service way and new McLean Lake subdivision access roads by approximately 1 km.

Existing McLean Lake residents would like future roadways to be designed to be less intrusive with simpler standards. For example, current practice is to clear the full ROW width, and residents question the need for such extensive disturbance. They also oppose creating more access points to the lake or an access road crossing McLean Creek to connect with McLean Lake Road.

If new mining activity occurs within the copper belt the old Copper Haul Road will become a key transportation link. The Whitehorse Copper ADS proposes all industrial traffic use the Copper Haul and McLean Lake roads to access the industrial lands. The City of Whitehorse has also indicated the Copper Haul Road may become a future truck bypass. The Whitehorse Copper ADS does not call for a road link between the McLean Lake residential area and the industrial lands to the south and north. A direct road connection across McLean Creek is not supported by residents and would break the integrity of the natural corridor. An access road could be extended to the west to connect with the Copper Haul road. The length of road required across the headwaters of the watershed and limited amount of developed land produced would not warrant such an investment at this time. However, if the Whitehorse Copper Haul road and industrial area develops as planned, a connection to the south or west would have merit.

2.6 Whitehorse Copper ADS

The Whitehorse Copper ADS has been accepted and approved by City Council. As described earlier, the ADS has several implications for the McLean Lake plan if the two documents are to be properly integrated. The Copper Mine ADS provides direction concerning access, environmental reserves and buffers, and industrial uses. The consequences associated with adoption of that plan are described throughout the text of this document.

⁷ Yukon Engineering Services Inc. et al., October 1999

2.7 Beyond Copper Ridge Feasibility Study

This study is a preliminary assessment of land development potential in the area south of Hillcrest/Copper Ridge, west of the Alaska Highway, and north of McLean Lake Road. Whereas the Whitehorse Copper ADS represents an initial land use plan that has been passed by Council, the Beyond Copper Ridge Feasibility Study does not carry the same weight. Nevertheless, some of the initial proposals in the feasibility study have implications for the McLean Lake area. These are as follows:

- ♦ Extending Hamilton Boulevard to the Alaska Highway directly across from the access to Robert Service Way. This would result in an intersection approximately 350 metres from the Lobird Road turn-off.
- ♦ There is a suggested zoning of “ Modified Country Residential” on the north side of McLean Lake Road.
- ♦ There is only one general indication of a natural linkage from the Beyond Copper Ridge area to McLean Lake.

2.8 Land Claim Selections

Kwanlin Dun and Ta’an Kwach’an First Nations have land selections in the McLean Lake area. The selected parcels are within the ADS planning area. The location, size and shape of these selections may change. The Management Steering Committee has directed the planning team to prepare a comprehensive plan for the entire area and put forward appropriate land use recommendations regardless of land ownership. City Planning staff is responsible for ensuring both First Nations are kept informed of the plans progress. The consultant has provided both First Nations with the opportunity to participate directly in the study and the City has invited representatives to participate on the Steering Committee.

2.9 Whitehorse Official Community Plan

The 1994 City of Whitehorse Official Community Plan (OCP) identifies the east half of the study area as suitable for urban residential development. The OCP also recognises the presence of the existing sand and gravel quarries to the northwest and designates lands around McLean Lake as parkland. It is assumed that the existing quarry leases will continue until all aggregate material is extracted and the area reclaimed for service industrial use. It was also assumed at the outset that City Council’s intent, as stated in the OCP, was still to support urban residential land use pending the results of this study.

3.0 Public Consultation Process

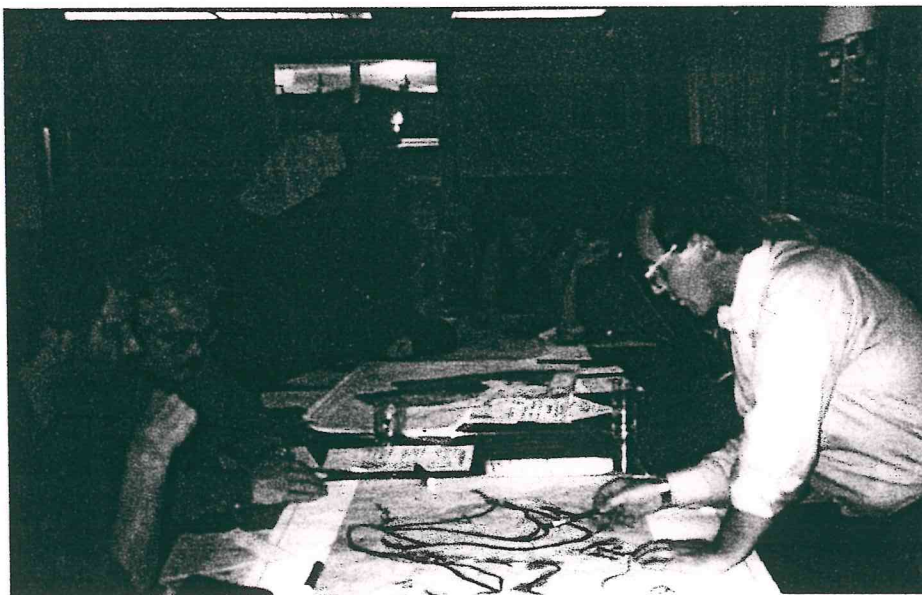
3.1 Summary of Public Involvement Opportunities

A number of the McLean Lake residents have lived in the area for over 20 years. Participation levels in the various consultation events were high. Questionnaires were distributed to all residents and three public open houses were held to allow the public at large an opportunity to participate. The process also included two charettes where local residents have participated in a bioregional mapping exercise (see Appendix B) and the development of a plan option (Appendix C).

The consultant's initial role included preparing and packaging background information in a manner that offered all participants a common base of understanding. In June 1998, an introductory newsletter was prepared for distribution outlining the study area, approach, and project consulting team plus the tentative schedule tentative schedule.

Key stakeholders were identified early in the process and interviews were held with McLean Lake residents, one First Nation and relevant stakeholders to collect background data, identify planning issues, opportunities and constraints.

The first McLean Lake Residents' meeting was held on-site June 24th, 1998. Discussion included an identification of planning issues, and scheduling of all meeting dates. A questionnaire designed to cover land use and servicing matters, recreation use, economic opportunities and development constraints was handed out. The residents returned fourteen questionnaires and a summary of the responses is included in Appendix B.



Planning charettes assisted in identifying key community feature and development options.

A base map was constructed from information provided by the City and other stakeholders, identifying the biophysical elements of the McLean Lake area and known development constraints (e.g., wetland areas, shallow bedrock). The background information was presented to the McLean Lake residents at the Community Bioregional Mapping Charette on July 21st, 1998. Draft land capability and suitability maps were also presented for resident review. The McLean Lake area residents constructed a bioregional map identifying non-development and development areas, in a biophysical as well as political context. The bioregional map was developed using information gathered from the residents and others familiar with the area. The map focuses on relationships and processes that contribute to the quality of life and enjoyment of the McLean Lake area. Results are summarised in Appendix C. The Community Bioregional Mapping Charette information, along with the technical data collected and a summary of the questionnaire results were presented at the Introduction & Issues Open House #1 on August 4th, 1998.

Following this phase, a second newsletter was prepared and sent out to all residents, highlighting the findings and indicating the next steps. The newsletter contained a list of the main issues, as well as ideas generated to date through public involvement and summarised resident input, stakeholder interviews and upcoming dates.



*Intersection
Lobird Road &
Alaska
Highway*

On August 25th, 1998, a Concept Development Charette was organised with the local McLean Lake Residents. ADS objectives, goals, principles and thematic options were discussed and some preliminary option assessment criteria were developed.

The ideas and concepts generated by the Charette participants were refined into three options and presented to the public at a meeting September 29th, 1998. Each of the three options contained features and responded to issues raised during the planning process.

For example, Option #2 included the option to extract gravel from the Sleeping Giant deposit in keeping with the OCP policy to protect important gravel sources even though the majority of residents opposed the idea. Concept #3 recommended several existing squatter lots either be relocated or reconfigured consistent with the priority attached to watershed protection even though the residents affected were not likely to support the idea. Option #2 also looked at the idea of creating two separate neighbourhoods, one with more conventional country residential standards and a second area where more variety of uses and more flexible standards would be applied. No clear consensus was apparent.

3.2 Issues and Concerns

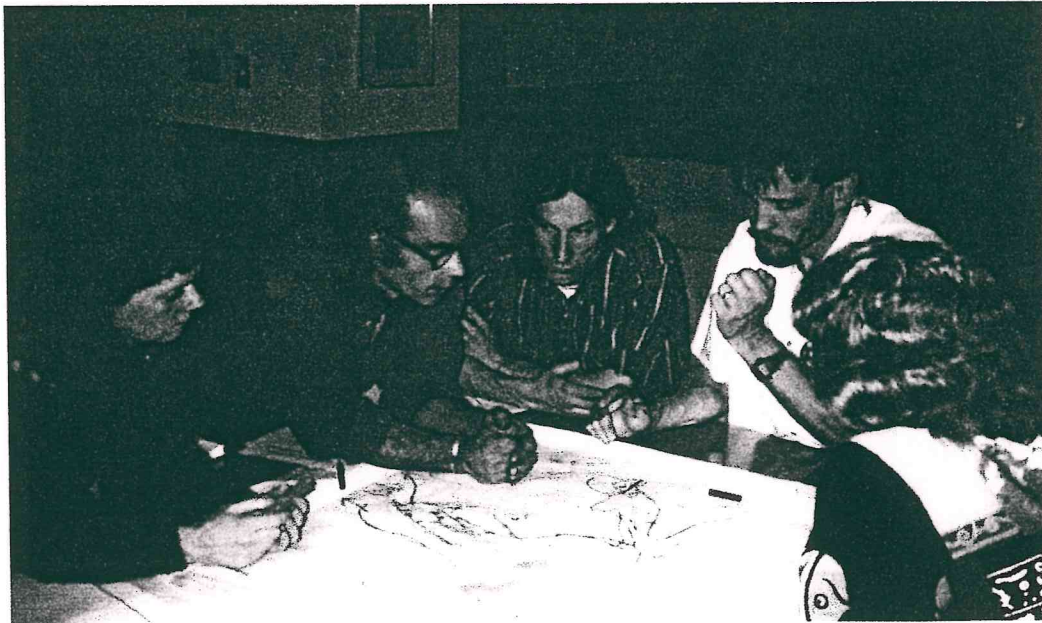
From the interviews, meetings, and questionnaire responses, several main themes were evident. The two main themes were the need to protect the entire watershed and ensure land use compatibility. The main issues and concerns raised are:

- A need to protect the entire McLean Lake watershed (lake, wetlands, creek, waterfall). This should also result in restrictions on the types of activities allowed in the watershed;
- A preference for reserving the existing trails for non-motorised use and integrating the existing trail network into the subdivision plan;
- A desire by residents for low-density development and large country residential lots, surrounded by open space where home-based businesses and low-impact, craft or cottage industries are permitted.
- A preference to see the existing road network, squatter lot configurations and character of the area retained where possible.
- A concern that the impact of adjacent land use is already affecting their quality of life (i.e. noise, dust, traffic, visual impact of quarry/industrial operations) and no action is ever taken;
- A preference to maintain a substantial buffer between the highway, industrial areas and residential area.
- A desire to see the McLean Lake, Beyond Copper Ridge and Copper Mine planning properly integrated with the cumulative impacts considered. Areas of potential conflict include:
 - the current and future use of McLean Lake Road
 - the future use of the McLean Lake quarries
 - the potential for further mining activity in the headwaters of McLean Creek
 - the width and location of the buffer between the proposed heavy industrial zone in the Copper Mine area and the expansion of the residential area in McLean Lake

4.0 Planning & Design Considerations

4.1 Design Assumptions

1. Most residents now hold title to their properties while others are currently going through the squatter legitimisation process. As the majority will receive 1 hectare parcels, it has been assumed that this will be the target parcel size for any remaining applications and that lot enlargements will not be considered unless required to implement the overall development plan.
2. It is assumed that access to the Alaska Highway will be restricted to a maximum of two locations and that every effort will be made to improve the current existing intersection conflicts.
3. It is assumed that the development costs for the entire subdivision will be apportioned across all lots with appropriate allowance for existing lot owners who have installed their own power lines etc.
4. A country residential development pattern is more compatible with existing development and the aspirations of current residents.



Community participation at many phases of the ADS is an important contribution to the planning process.

4.2 Planning Considerations: Goals & Objectives

The goal of the McLean Lake ADS is:

To build a diverse country-residential neighbourhood that integrates the values and lifestyles of local residents, protects the integrity of the McLean Lake watershed and provides a range of housing and home-based employment opportunities.

The following objectives reflect the goal statement:

Protection of the integrity of the McLean Lake watershed is a priority. The watershed will be protected by:

- ♦ *Restricting the types of activities allowed in and near sensitive areas such as the wetlands and creek.*
- ♦ *Establishing a buffer zone around the lake and along the watercourse of sufficient width to protect sensitive wetlands, the forest edge and fisheries habitat by adopting the principle of no net loss;*
- ♦ *Protecting the quality of the watershed water as a source of potable water for local residents.*
- ♦ *Encouraging groundwater recharge and surface run-off filtering through the location and design of roads, ditches and lot development practices and avoiding developing a road crossing of McLean Creek.*
- ♦ *Identifying the need to conduct hydrogeological studies and monitor water quality; and*
- ♦ *Ensuring trail development and recreational use of the area remain consistent with the environmental projection mandate.*

The existing trail network will be integrated into the subdivision plan by:

- ♦ *Providing only non-motorised access to McLean Lake.*
- ♦ *Maintaining the existing trail network as much as possible and integrating any future trail development into the open space system to allow continuous motorised and non-motorised access into, through and out of the neighbourhood in a consistent manner;*
- ♦ *Anticipating possible trail use conflicts which may occur if the Copper Haul Road, currently a popular snowmobile trail, becomes a key transportation link.*
- ♦ *Developing trail linkages from inside the subdivision to both the McLean Lake and Copper Haul roads for motorised and non-motorised recreation as part of the future Trans Canada Trail system; and*
- ♦ *Maintaining opportunities for public outdoor education, fishing, bird watching etc.*

The subdivision plan will provide an opportunity to integrate the existing residents and lifestyle preferences into an overall neighbourhood concept by:

- ♦ *Adopting a low density country-residential development form that respects site characteristics, mean average lot sizes, and proximity to open space that makes the area attractive;*
- ♦ *Retaining and incorporating as much of the existing road and trail network as possible:*
- ♦ *Examining the potential for alternative development standards (rights-of-way clearing widths, road & drainage standards etc.) to encourage sustainability, homeowner stewardship and neighbourhood uniqueness;*
- ♦ *Phasing development to ensure an orderly and economic development pattern such that areas with slopes of 8% or less are given priority.*
- ♦ *Ensuring basic services to existing residents including power and roads are upgraded in an efficient manner*

The road system will ensure an even distribution of traffic flow, allow for future bus circulation and traffic separation by:

- ♦ *Limiting access to the Alaska Highway to only two points with proper sight lines and intersection separation distances;*
- ♦ *Providing the option for a future connection to the Copper Haul Road if needed;*
- ♦ *Recommending changes to the Copper Mine ADS and Beyond Copper Ridge plans so McLean Lake Road ties into the Hamilton Boulevard extension and provides primary access to the light industrial area in the former McLean Lake pits and secondary access to the heavy industrial area via the Copper Haul Road;*
- ♦ *Not providing a north-south road connection to McLean Lake Road across McLean Creek;*
- ♦ *Limiting access to the subdivision from the Alaska Highway to two point and one common access point between KoKen Contracting and the Philmar RV Service centre*
- ♦ *Planning an internal collector road looping through the subdivision, to balance traffic loads facilitate public transit and improve fire protection access.*

To ensure a safe, sustainable community by:

- *Implementing a forest fire risk reduction plan as part of the detailed subdivision design;*
- *Limiting access to the neighbourhood from two main access points off the Alaska Highway;*
- *Permitting a range of home-based businesses to encourage residents the opportunity to live and work within the community;*
- *Encouraging community stewardship and direct involvement in such activities as air and water quality monitoring, annual bird and wildlife counts and similar activities;*
- *Discouraging through traffic and regulating vehicle speed in residential zones; and*
- *Providing buffers and other measures that control ditch run-off, reduce noise levels and control dust.*

The McLean Lake, Beyond Copper Ridge and Whitehorse Copper Area Development Schemes will be integrated by:

- ♦ *Proposing compatible land uses adjacent to one another, taking into account past, present and future land uses and their associated impacts (i.e. noise, dust, traffic, visual impact of quarry/industrial operations).*
- ♦ *Protecting the Copper Haul Road as a transportation and utility corridor;*
- ♦ *Not encouraging additional development along the McLean Lake Road until the gravel quarries are exhausted and the road can be properly tied into the Beyond Copper Ridge plans;*
- ♦ *Ensuring industrial activities including any future mining activity within The Copper Mine planning area and McLean Lake quarries takes into account the need for noise attenuation, dust control and visual buffers by applying buffer widths appropriate to the location and activity proposed;*
- ♦ *Integrating all existing lots into an economic and serviceable plan that minimises the need for lot boundary adjustments and anticipates future servicing needs;*
- ♦ *Encouraging sequential land use or relocation depending on the land use priorities accepted in the plan.*
- ♦ *Promoting natural open space linkages between the three areas to provide habitat movement corridors, continuous trails and the preservation of those landscape features that make the area unique.*
- ♦ *Requiring proper end use and landscape rehabilitation plans for the Copper Mine tailings and existing gravel quarries to ensure the optimal utilization of available land*

5.0 Development Concepts

The following is a description of two proposed concepts for the McLean Lake Area Development Scheme. As a result of the input received from the last public Open House in September 1998 and the direction from City Planning staff two options are proposed for final review and selection of a preferred concept. Each concept identifies different priorities: Concept #1 features Maximum Country Residential Development; Concept # 2 features Distinct Neighbourhoods. Pros and Cons for each concept are outlined.

5.1 Concept # 1: Maximise Country Residential Development

- Existing lot configurations are retained and “grandfathered” into the subdivision plan with building /setback restrictions applied to those lots abutting McLean Creek
- The existing wetlands are protected and the watershed integrity preserved, with lands environmentally sensitive lands defined - only passive recreation and trails permitted
- A large central community school/ park feature (i.e., playfields/community centre, primary school) is included
- A core loop road and double access points to the Alaska Highway is provided. More internal through roads to facilitate development phasing are included.
- Possible future connection to Copper Haul Road provided
- Minimum lot size 1 hectare
- No development of “sleeping giant” gravel resources; puts 80% of required heavy industrial use separation on disturbed tailings ponds
- Most “conventional” subdivision design
- No crossing of McLean Creek required and substantial buffer provided along Alaska Highway
- Will require reclamation of some sections of Squatters Road and existing power lines
- Adopts community resource lands concept from Copper Mine ADS around McLean Lake

PROS

- Provides good road circulation and safe access to Alaska Highway
- Least amount of alteration to existing resident lot boundaries
- Simple, uncomplicated lot layout, compact form facilitates phased development
- Large central park on flat ground, sized to accommodate a primary school, (if required)
- Provides for future road connection option to Copper Haul Road and collector loop road
- Minimises need for lot boundary adjustments to integrate existing lots into the new development
- Eliminates internal “backyard” greenbelts in response to public safety concerns (i.e. theft, inappropriate activity)

- Responds to public watershed protection priority and Official Community Plan (OCP) residential development and environmental protection policies
- Provides for future public transportation circulation within 5 minute walking distance
- Good highway buffers and open space links
- Copper Mine ADS setbacks accommodated within that area; more useable land kept for country residential uses

CONS

- Conventional design, does not respond to full range of lifestyle concerns
- Compromises stated watershed protection priority by “grandfathering” existing lots that encroach on McLean Creek. Encroachments limit linked trail development options along McLean Creek
- Number of through roads reduces privacy, encourages short-cutting and increases theft concerns (multiple escape routes)
- Design does not create as good a sense of neighbourhood as Concept #2
- Does not protect “Sleeping Giant” gravel resource potential contrary to existing OCP policy

5.2 Concept # 2: Distinct Neighbourhoods

- Loop roads with separate single access points to create distinct neighbourhood units but with road connection between two using former road
- Provides option for conventional and alternative lifestyle neighbourhood units with different servicing standards
- Results in more compact development form and peripheral open space
- Existing lot configurations retained and “grandfathered” with building/setback restrictions along wetlands
- Sleeping Giant gravel potential developed using “donut” mining method
- Community Centre site located between two neighbourhood units, connected by Squatters Road
- 65% of 1000M heavy industry/country-residential setback accommodated within McLean Lake ADS to increase amount of usable industrial land
- Design incorporates more cul-de-sacs to increase privacy
- Minimum lot size one hectare

PROS

- Provides opportunity to experiment with different road and servicing approaches to suit different lifestyles
- Responds to a broader number of Official Community Plan (OCP) policies
- Less through roads and more cul-de-sacs which create “mini-neighbourhoods “
- Supports “Sleeping Giant” gravel extraction proposal
- Community centre site is “central” to both neighbourhoods
- More concentrated development

CONS

- Lower lot yield increases per lot development cost
- Sleeping Giant is the highest hill in the area and offers commanding views of surrounding area. Notwithstanding proponents mining strategy, majority of existing residents do not support proposal because of proximity, and concern for McLean Lake/watershed protection
- Allows heavy industrial land to encroach closer to industrial areas
- Requires amendment to Copper Mine ADS
- Existing lot watershed encroachments are "grandfathered" undermining watershed protection priority argument and making continuous creek trail difficult
- Two neighbourhood units approach could undermine overall sense of "community" and create internal conflicts
- Maintaining existing Squatter Road/Alaska Highway intersection only compounds existing traffic safety conflict with multiple access roads between Robert Service Way, Lobird and Squatters roads.

Residential

5.3 Site Servicing

The following discussion of site servicing issues applies to either development option. Included are engineering design criteria as well as a general assessment based on available information, and preferred options.

Access

Sight line and RTAC standards suggest there are two feasible main access points into the new subdivision from the Alaska Highway given the topography, presence of existing private property and the desire not to cross McLean Creek. Taking into account technical standards and resident concerns, the following two access options are considered most viable.

Option #1:

Immediately North of Canyon Crescent Subdivision (Rating: Good)

PROS	CONS
<ul style="list-style-type: none">• adequate vehicle sight-lines• moderate grades from highway• relatively modest construction costs	<ul style="list-style-type: none">• proximity to existing Canyon Crescent intersection• best suited as secondary access

Option #2:

Opposite North Entrance to Shell Station (Rating: Good)

PROS	CONS
<ul style="list-style-type: none">• good vehicle sight-lines & grades• moderate grades from highway• low construction costs	<ul style="list-style-type: none">• requires relocation of Lobird Road• best suited as primary access

There are a number of relevant policy questions external to this examination that could affect the final intersection points. These issues include:

- The Yukon Engineering Services study "Beyond Copper Ridge" (Oct. 1999) suggests that Hamilton Boulevard be extended to intersect the Alaska Highway at Robert Service Way. This would then become a major four-way intersection and result in 3 main intersections in approximately 700m.
- The two existing intersections at the north end of the subdivision area are problematic. The McLean Lake Road has a relatively steep grade to the highway and there is poor intersection geometry between the Lobird Road and the McLean Lake Road. Improving the intersection geometry and combining access points may be possible but must be considered within the context of the Robert Service Way intersection.
- The Whitehorse Copper ADS suggests a road network that upgrades the importance of the existing McLean Lake Road for industrial traffic but it does not discuss the road design implications or the proximity of the intersection to Robert Service Way.
- Final land claim selections may eliminate the two preferred locations *Lead to negotiations on two preferred locations*
- Concept #2 provides for a service road to connect the existing Squatters road to McLean Lake Road. It assumes McLean Lake Road would be realigned to connect to the Hamilton Boulevard extension behind the High Country RV Park. This would provide a round about way to enter the subdivision but would eliminate the two existing intersections.

A number of locations along the Alaska Highway adjacent to the study area were considered. Of these, three were considered feasible and are discussed briefly as follows:

- a) The southerly access point that is common to both Concepts #1 and #2 is considered to be suitable. It allows for adequate sight lines and a gentle grade to higher elevations in the subdivision.

- b) The north access point in Concept #1 is roughly opposite the north side of the Shell property. It is also acceptable in that suitable sight lines can be maintained and access grades can be made suitable with moderate cuts.
- c) The north access point in Concept #2 is located at the existing Squatters Road entrance. Sight lines and grades are adequate. The intersection would have to be reconstructed to provide improved geometry and grades.



Access to the McLean Lake area must be improved if further residential development occurs.

Roadways

The following design criteria were used in the engineering assessment work:

- 25 m R.O.W. (Full R.O.W. clearing would normally be required except possibly for country lanes in Option 2.)
- RLU 50 RTAC Standard
- Curve radii: 80 m min.
- Maximum road grades: 8%
- Road surface: BST
- Road structure: 100 mm base course material over 200 mm granular subbase (EBA Geotechnical Evaluation – Sept. 10, 1998)
- Road Sections: 9.0 m for rural collectors
8.0 m for rural local streets

(Possible narrower road sections at 7.0 m for country lanes in Option 2, but would require special approval by City.)

With the road network as proposed in Concepts 1 and 2, the above design criteria can be met. Some areas having steep slopes will require greater cuts and fills to maintain grades within the design limits of 8%.

Ideally, the maximum grades will be closer to 6% but this cannot be accurately projected at this time since the topographic detail is compiled from aerial photography. As such, there is a built-in accuracy limitation.

The soils are generally suitable as a base structure for roadway construction as outlined in the EBA Geotechnical Evaluation. However, shallow bedrock may be encountered during construction in the central portion of the area. Further geotechnical investigative work should be carried out at the subdivision design stage after the rights-of-way have been cleared to delineate bedrock in critical areas. Accurate depth to bedrock can be determined using ground penetrating radar. By doing this, the roadway design may be adjusted to make it as cost-effective as possible by balancing cuts and fills while avoiding bedrock where possible.

Storm Water Management

In general, storm water within the subdivision can be adequately handled through the use of ditching and culverts to off-road discharge. The soil types in the study area are generally quite permeable and will allow for dissipation of surface runoff fairly rapidly. Nonetheless, due to the environmental significance of the McLean Lake drainage system and relatively steep topography in some areas, the designs will have to be sensitive to such issues as scour and sediment transport. The designs should include consideration of the following:

- The use of ditch dams in steep areas to reduce scour and material transport.
- The potential to encourage groundwater recharge;
- The suitability of storage ponds to collect storm runoff from ditching and allow for dissipation over time; rather than direct discharge into the drainage system, which may introduce unwanted silt load; and
- The need for special attention to be paid to off-road discharge of storm water into undeveloped areas, so it will not impact negatively upon properties or natural drainage courses.

Water Supply

In the 1990 *Whitehorse Water and Sewer Study* by Stanley & Associates, an option for servicing the McLean Lake area with a supply pipeline was discussed. It consisted of a 350-mm supply line running from the Hillcrest 'B' reservoir to the McLean Lake area, which would also supply Lobird Trailer Court en route. The cost estimate for constructing this supply line in 1990 was estimated at \$3,300,000. Servicing the Lobird Trailer Court from this supply line was estimated at an additional \$590,000. The high cost of providing piped water to the McLean Lake Subdivision is only considered to be cost-effective in a high-density urban lot configuration. It is not a cost-effective option for servicing the area with the proposed low-density, large-lot configuration that is proposed in Concepts 1 and 2.

As such, the only two cost-effective options for water supply at this time are drilled wells or water delivery. As reported in the 1987 Klohn Leonoff Report, wells may be marginal in some areas having a relatively low yield (0.08 to 0.24 lps. or 1-3 gpm). Sixty metre depths can be anticipated. Water delivery or self-haul is already practised at most residences in the area at this time. It is expected that both methods would be used, wherever appropriate, as the subdivision is developed.

It is worth noting that the existing Copper Ridge water reservoir is only sufficient to accommodate the existing build-out of the Copper Ridge area as anticipated in the original UMA Engineering design. The 1999 Beyond Copper Ridge study by YES Engineering assumed water would be extended from the airport along the Alaska Highway rather than from a new intake on the west side of Schwatka Lake up Robert Service Way. The YES study terms of reference did not call for any discussion of whether further extensions to include the McLean Lake area would be feasible.

Sewage Disposal

A piped sewage collection system is not considered feasible for this area due to the size and spacing of lots and the high cost of providing such an infrastructure for such a small population. On-site sewage disposal is feasible for most of the area, based on investigative work carried out by EBA Engineering in 1998. There are some constraints and considerations identified, which are discussed as follows:

- ♦ Shallow bedrock in the centre of the site may restrict the location of on-site systems. A standard on-site system design requires at least 2.7 m of soil over the bedrock in order to meet Environmental Health Guidelines. This allows for 1.2 m of cover over the piping and 1.2 m of accepting soil between the drain rock and bedrock. The total depth could be reduced if rigid insulation is placed over the piping, thus reducing the soil cover requirement to 0.6 m. In this case, the soil depth requirement could be as little as 2.1 m. Alternatively, a mound approach can be used that involves importing extra soil to achieve the desired soil cover depth.
- ♦ Percolation rates were reported by EBA to range from 6 to 25 min./25 mm. The earlier Klohn Leonoff report found percolation tests to vary from 3.8 to 26.0 min./25 mm. The soil types vary throughout the site but are generally reported to be silty sand till soils. They appear to be well suited for on-site sewage disposal. Where the percolation rate is found to be faster than 5 min./25 mm, a 600-mm layer of filter sand will be required beneath the drain rock.
- ♦ Some of the lots in both concepts will have slopes in excess of 10%. This will require the use of wide trench or deep trench systems. Absorption beds will be possible where slopes are less than 10%.

- Percolation testing and excavations (to identify bedrock) will be required on each lot by the lot owner to design and locate the septic system properly. The results of this site investigation may dictate the location of the residence and, therefore, should be carried out before the building is positioned.

Power, Telephone and Cable TV

Electrical service to the subdivision will be provided with an overhead line system with a pole at a 60-m spacing. Telephone and cable servicing will be provided using the Yukon Electric-owned pole system.



*Previous
geotechnical work in
the McLean Lake
area.*

6.0 Recommended Concept

The recommended development concept will be determined after presentation of the two refined designs to the public and receipt of their feedback. It is suggested that the results of the public consultation and feedback from the internal review by City staff be presented to the Steering Committee for discussion and selection of the final concept.

6.1 Land Use Concept

6.2 Land Use Policies

The land use policies will include specific statements regarding residential, commercial and industrial development, transportation and servicing, protection and use of environmentally sensitive areas and open space, and integration with adjacent plans.

7.0 Implementation

This will outline the recommended timing and sequence of development, need for any OCP or ADS amendments etc.

7.1 Further Studies Required

The main concerns here include the need to protect the McLean Lake watershed and resolve the Alaska Highway intersection issues. To protect the watershed, more specific information is required about watershed dynamics including the hydrogeology of the area. The Alaska Highway intersection concern focuses on the multiple access points in close proximity to Robert Service Way. It is recommended that the existing McLean Lake Road be linked back to Robert Service Way and the present Squatters Road access be eliminated.

7.2 Performance Standards

The introduction of performance standards at the ADS and subdivision design stages is becoming more prevalent especially where cumulative development impacts are considered to be a possible concern. Typically, performance standards are being put forward where environmental sustainability objectives are anticipated.

As protection of the McLean Lake watershed is a stated priority, it is possible to establish a set of measurable performance standards that corresponds to this objective. Examples of appropriate standards would include:

Indicator	Measure
▪ Wetland habitat condition	▪ No net loss measured in spatial and biological diversity terms
▪ Bird and wildlife diversity	▪ Number of species present unchanged or greater than present prior to development
▪ Stable fish populations present in McLean Lake drainage	▪ Population remains at self-sustaining levels
▪ Water quality	▪ No deterioration in standard water quality parameters after development
▪ Setbacks and buffers maintained	▪ No evidence of encroachment including tree cutting, habitat alteration

Appendices

- A Extract- National Building Code of Canada 1995**
- B McLean Lake Resident Questionnaire**
- C Summary of Questionnaire Responses**
- D Summary of Bio-Regional Mapping Charette**
- E Consultation List**

Appendix B: McLean Lake Area Development Scheme Questionnaire



The information gathered from this questionnaire will be used in mapping existing land use and land capability. It will also provide background data for the two design workshops which will result in a final area development scheme (ADS). Your input is appreciated.

Background Information

How long have you lived in the McLean Lake Area?

1-5yrs _____ 6-10yrs _____ 11-15yrs _____ 16-20yrs _____ more _____

Do you live in this area year-round? _____ Summers only? _____ Winters Only? _____

Do you rent _____, own _____, or are you in the process of acquiring title? If rent, what is the name of the owner? _____

How many people live on this property? _____ How many are school age _____, and preschool _____?

Do you use this property for any business related activities? (i.e. home-based business)

Do you currently have any of the following? (check all that apply)

Power _____	Telephone _____	Well _____
Septic system _____	Pit Toilet _____	Trucked water _____
Holding tank _____	All Weather Access _____	Other _____

What method of transportation do you use to travel out of the community into town?

Vehicle _____ Public Transportation _____ Bicycle _____ Walk _____ Other _____

Quality of Life

As a resident in this area, what qualities are most important to you?

In the last five years, have you noticed any changes in how the McLean Lake area is used? What kinds of changes?

Are there any areas within your community which seem to be only used by McLean Lake residents?

Besides residents, who else have you observed using the McLean Lake Area and what kind of activities are they doing there?

Economic Opportunities

What, if any, economic opportunities do you feel could exist in the McLean Lake Area? Please explain why.

What kinds of economic activities do you feel are inappropriate in the McLean Lake area?

Environmental Concerns

What five words would you use to when describe environmentally sensitive areas within the planning area?

For areas requiring protection, how should this occur? Please check all that apply.

Environmental Reserve _____ Park _____ Seasonal Protection _____
Buffers and Setbacks _____ Designated trails (motorised, non-motorised) _____
Other(Please Specify) _____

What are the environmental considerations that should play a part in future planning?

Planning and Design Principles

What makes the area you live in now seem like "home"?

What factors would you like us to consider in incorporating existing lots into an overall plan?

Land Use Activity

What land use activities concern you as a resident?

Are there any conflicts occurring between residential and economic activities at current activity levels?

Have these activities affected you and if so, how?

What changes in land use activities do you think will occur in the future?

Access

What should be considered in planning access into the McLean Lake area?

Other Comments

Survey completed by (optional) Name _____ Address _____
Phone # _____

Please Return Completed Survey to: McLean Lake ADS, c/o Inukshuk Planning and Development, 207 Elliott Street, Whitehorse, Yukon, Y1A 2A1 Phone: (867) 667-4759
Fax: (867) 667-4020 OR email: Inukshuk@yknet.yk.ca OR You can drop your completed questionnaire off at Patrick Royle's house.

Please Respond by July 5, 1998

Appendix C: Summary of Questionnaire Responses

Local residents in the McLean Lake area were contacted at the end of June 1998 and given the opportunity to comment on the McLean Lake area through a questionnaire (see above). Fourteen residents returned the questionnaire with their ideas, concerns and comments. These are summarised below.

Quality of Life

As a resident in this area, what qualities are most important to you?

The majority of McLean Lake residents appreciate the peace, quiet and privacy of the McLean Lake area, with a minimal amount of noise, light and air pollution, or commercial development. The proximity to the natural environment and easy access to features such as the waterfall and McLean Lake were also high on the list. Other important qualities of their lifestyles included: an affordable lifestyle due to a low level of infrastructure, a feeling of safety and support from the community, the short distance to downtown and essential services, a lack of traffic congestion and the "organic" character in which the community has evolved.

In the last five years, have you noticed any changes in how the McLean Lake area is used?

The most frequently noted change in the McLean Lake area appears to have been an increase in the amount of traffic using the gravel pit haul road and this has caused an increase in noise and dust. One positive change has been an increase in the number of birders, recreational canoeists and fishermen using the area. However, another resident actually mentioned that since catch and release has been implemented, there has been less traffic in the McLean Lake area.

Are there any areas within your community which seem to be only used by McLean Lake residents?

There appear to be many places within the McLean Lake area that are used only by McLean Lake residents. These include the dead end road (cul-de-sac), many of the walking trails, the waterfall pool, both lakes, the dry marsh and the creek on the south side of the highway.

What activities do non-McLean Lake residents do in the area?

Activities mentioned by McLean Lake residents included:

- *winter sports (Skidoos, x-county skiers);*
- *less desirable activities (dumping garbage, break & entering, hiding stolen goods);*
- *industrial activities (people involved with gravel extraction);*
- *solo non-motorised sports/ activities (bird watching, walking, fishing, professional photographers, horseback riders, biking, berry picking, sunbathers); and*
- *group/motorised activities (family recreational outings, those just out for a drive).*

Economic Opportunities

What, if any, economic opportunities could exist in the McLean Lake area?

The majority of respondents mentioned small cottage industries (pottery, blacksmith, gardening, horse rental, artists' studios, nursery-gardeners, small-scale and large-scale agriculture, B&Bs and retreats, consulting businesses, recreation opportunities, and walking tours of unique natural features) as being suitable economic opportunities. Industry in the Gravel Haul Road area was acceptable as long on the condition that it was not too loud or causing environmental damage. Power and telephone was seen as an advantage for future home based businesses.

What kinds of economic activities do you feel are inappropriate in the McLean Lake area?

Industrial activity with a high amount of noise or air pollution was the most frequently mentioned unsuitable economic activity as well as any activities which would jeopardise the water quality of water in the creek. High amounts of traffic were also mentioned as being undesirable. Commercial development, dog teams or kennels, rental apartments, condos or trailers and storage lots were also felt to be inappropriate.

Environmental Concerns

For areas requiring protection, how should this occur?

The majority of respondents favoured setting buffers and setbacks as a method for environmental protection. Designating sensitive areas as environmental reserves and designating trails for non-motorised use also received strong support.

What are the environmental considerations that should play a part in future planning?

Respondents appeared to favour low density, country residential development for the McLean Lake area. The residents strongly favour limiting the amount of deforestation, developing a minimal number of new roads and using buffers and setbacks as guidelines for development emphasizing low-impact, site-sensitive design. Limiting the amount of pollution, avoiding development near the wetlands or creek, and controlling any motorised access onto the trails were also mentioned.

Planning and Design Principles

What makes the area you live in now seem like "home"?

The undisturbed natural land and wildlife, along with a high amount of privacy were qualities that the residents identified with. Personal memories and having lived in the McLean Lake area for a long time, were also cited as reasons for the McLean Lake area being "home". Other qualities mentioned were: the system of recreational pathways throughout the region, the narrow, winding, undeveloped roads, a lack of restrictions on pets, and the low cost of living.

What factors would you like us to consider in incorporating existing lots into an overall plan?

The McLean Lake residents' strongest desire for any future development is for it to reflect the existing residential patterns (rather than taking a grid pattern approach) and to be site-sensitive, working with the existing topography and vegetation. Plenty of "green space" with a trail system/green belts that maintain access to "special areas" is also a high priority. Wide buffers protecting all environmentally sensitive areas, is also important. Many residents support low density development, seeing this as a way to maintain their current level of privacy. Other factors mentioned were: integrating alternative lifestyle options and home-based businesses, not applying the cost of development to existing residents, allowing existing residents to expand their lot sizes and considering potential social conflicts between the new and existing residents.

Land Use Activity

What land use activities concern you as a resident?

Industrial land use in the McLean Lake area concerns current residents and some fear the encroachment of gravel pit operations towards the creek and wetlands. Others would like to see the area protected against motorised recreational vehicles.

Other current concerns include: the future density of urban development, uses other than residential, potential traffic and noise, water pollution and dog mushing.

Are there any conflicts occurring between residential and economic activities at current activity levels?

The current amount of traffic on the haul road and noise from gravel crushing were seen by some as an existing conflict. One resident mentioned that the beaver dam at McLean Lake has been destroyed several times and this was seen as being damaging to the sensitive wetland. The necessity for development of this area for real estate was mentioned as an existing conflict of interest.

Have these activities affected you and if so, how?

The road and gravel crushing noises were said to be a general disturbance, keeping children awake and presenting some danger. Some negative behaviour and attitudes from operators and municipal staff were mentioned as being frustrating and distressing by residents attempting to put limits on the industrial activity. Uncertainty about the future use of this area was mentioned.

What changes in land use activities do you think will occur in the future?

The local residents cited a wide range of changes in land use activities in the McLean Lake area. These include:

- *an increase/decrease in industrial activity in the Gravel Haul Rd area (3)*
- *more people using the land and higher population densities (3)*
- *more regulations, bylaws, and zoning changes (2)*
- *a decrease in land owners privacy and loss of the current life style (2)*
- *limits/bonuses to small business activities and artists' pursuits (2)*
- *buses (school buses also) (1)*
- *more development (e.g., playgrounds, strip malls, mini golf) (1)*
- *more respect for the history and environment of the area (1)*
- *an opportunity for creative and innovative planning (1)*

Access

What should be considered in planning access into the McLean Lake area?

Almost all the respondents would like any future roadways to be designed with a minimal road right-of-way width, length, and minimal sight line clearance. A low cost gravel road, to reduce the economic impact on existing and new residents and to keep the speed limit down to about 5 mph, was also preferred. The existing narrow winding roads appear to be greatly favoured over "the runway sized straight roads that one finds in most country residential areas". Several respondents prefer a single entrance and exit road to a through road that connects with other planned or existing subdivisions. People also oppose creating more or alternative access points to the lake or an access road crossing McLean Creek from either McLean Lake or Lobird Road. An increase in the amount of traffic will be inevitable and residents would like both safety and residential quality of the area to be taken into account when planning any future access.

Appendix D: July 21, 1998 Bioregional Mapping Charette Bio-Physical Units

Working with the residents and technical background information, the McLean Lake area was divided into four "units" which have similar patterns of terrain and current or historical use.

Unit 1 - McLean Creek

This unit comprises the entire 7 km long watercourse of McLean Creek and includes Upper McLean Lake, Mclean Lake, the wetlands, a waterfall and canyon along the course of the creek. The creek and wetlands provide habitat for a variety of fish and fauna, while steep bluffs overlooking the wetland provide opportunity for avian predators to feed and nest.

Previous channel modifications have been constructed for diversion or drainage of the creek. Above the falls, a diversion channel was constructed to divert water into Ice Lake which served as a water source for the military base which is now Lobird Trailer Park. A marsh area below the falls was drained to extract topsoil. The creek continues to provide a source of potable water for McLean Lake area residents.

Land use throughout the McLean Lake area will likely impact this unit, especially water quality and quantity, as well as fish and waterfowl habitat within the region.

Unit 2 - Squatters' Road/ Large Hill

This is the largest and most diverse bio-physical unit in the McLean Lake area. The area has long been subject to human occupation and use, including fuel wood harvest, resource exploration, gravel extraction, recreation and residential development. Previous development has created a legacy of small refuse dumps, ad hoc road and trail networks and abandoned machinery. It has also resulted in the establishment of a loose-knit community, known locally as Squatters' Road.

Proposed development under the McLean Lake ADS will predominantly impact on this unit. Increased access and residential development will result in heavier recreational use. Improved road networks may result in the need to abandon or reclaim existing unimproved roads. Residential development will result in the removal of forest cover and installation of septic systems, if country residential development is supported. The relative isolation of current residents is also subject to change with further development of the area.

Unit 3 - Gravel Bluffs

The large knolls north of McLean Lake are a significant local deposit of gravel. The larger knoll to the east has been identified as a potential extension of the McLean Lake quarry. The flat topped knoll to the west is a significant landmark, known as the "Sleeping Giant". A 1997 geotechnical study by EBA Engineering has confirmed that the "Sleeping Giant" contains up to 2.5 million m³ of sand and gravel. This hill was under consideration as an alternate gravel source by Territorial Concrete, in 1997, who planned to relocate from Ear Lake. The knoll currently provides a visual and noise buffer to quarry activity to the east and north.

Land use within this unit may affect slope stability of the steep scarps, as well as impacting on view-sheds from adjacent areas. Significant improvement of the road network is required to access the area.

Unit 4 - Tailings Dam and Meltwater Channel

A meltwater channel to the north and west of Canyon Crescent has previously been modified by construction of a dam for retention of mine tailings. This retention pond does not discharge into the lower channel, however spring-fed discharge into the wetland causes glaciation during the winter in most years. A steep scarp slope along the lower channel forms a significant barrier to access from the north.

Land use within this unit may impact water flow and winter ice formation along the lower creek channel.

Appendix E: Consultation List

Consultation List
Yukon Fish & Game Association
Yukon Conservation Society
Yukon Cohousing Group (Suat Tuzlak)
Yukon Bird Club
YTG Renewable Resources (Fisheries, Wildlife, Habitat)
YTG Heritage Branch (Archaeology)
Whitehorse Riding Stables (use area trails on a regular basis)
Ted Davis (not a legitimate squatter, lives within Billy Johnson's land claim)
Ta'an Kwach'an First Nation
Sylvia McDougall (owner and resident for 30 years)
Scott Price
Ron Newsome
Norman McIntyre (purchased lot from squatter 1½ years ago)
Michele Moreau and Patrick Royle (purchased lot from squatter 5 years ago)
Marianne Darragh (resident for over 20 years)
Lil Gruback-Hambrook
Laurent Cyr (father horse-logged in area)
Klondike Snowmobile Association
Katie Kuiper (renter)
Jenny and Skeeter Wright (owners and residents for 20 years)
Grant Westman (owner, but rents out property)
Government of Canada Department of Fisheries & Oceans
Eileen Anna O'Hara (owner and resident for 17 yrs)
Dave Farwell (resident 23 years)
Darlene Iannone (resident 25 years)
Bronwyn and Alyx Jones (residents of area 24 years)
Bob Kuiper & Catherine Kennedy (lot owners)
Barbara Joughin (resident 9 years, now in Nanaimo, currently renting out property)
Andrew McDonald (rents from Dave Clarke)
14567 Yukon Inc.

MCLEAN LAKE AREA DEVELOPMENT SCHEME



**INUKSHUK PLANNING
& DEVELOPMENT**



- LEGEND:**
- Lake
 - Wetlands
 - Tree Line
 - Road
 - Out-Line
 - Study Area Boundary
 - Buildings
 - Contour Information

Mapshot Data copied from Northwest Survey Group plan published in 1984.



DRAFT

- LAND USE**
- COUNTRY RESIDENTIAL
 - PARK & OPEN SPACE
 - HIGHWAY COMMERCIAL
 - COMMUNITY CENTRE

243-23

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CONCEPT #1



MCLEAN LAKE AREA DEVELOPMENT SCHEME



**INUKSHUK PLANNING
& DEVELOPMENT**



- LEGEND:**
- Water
 - Wetlands
 - Tree Line
 - Road
 - Out-Line
 - Study Area Boundary
 - Buildings
 - Contour Interval
- Mapping Data copied from Neighbourhood Survey Group
Mapping Date copied from Neighbourhood Survey Group published in 1984.



- LAND USE**
- SLEEPING QUANT QUARRY
 - COUNTRY RESIDENTIAL
 - PARK & OPEN SPACE
 - HIGHWAY COMMERCIAL
 - COMMUNITY CENTER

CONCEPT #2

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CONSULTING ENGINEER
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