October 10, 2001

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UMA Engineering Ltd.
17007 – 107 Avenue
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Attention: Mr. Roland Merkosky, P. Eng.
Design Manager

Subject: DEW Line Clean-up Project
FOX-5 Landfill Siting

INTRODUCTION

EBA Engineering Consultants Ltd. (EBA) was requested by UMA Engineering Ltd. (UMA) to evaluate potential landfill locations at the FOX-5 DEW Line site on Broughton Island, Nunavut. Landfill locations were previously evaluated (EBA 2000); however the need for additional locations was required due to a change to the FOX-5 DND reserve.

A site visit occurred from August 15 to August 18, 2001. Four alternative sites were evaluated. This was carried out using air photos, visual reconnaissance and hand excavated shallow testpits. Topographic surveys were carried out on September 1, 2001 by UMA and Focus surveys. Environmental baseline sampling was carried out by Environmental Sciences Group of the Royal Military College during the end of August 2001.

SITE DESCRIPTION

The FOX-5 DEW Line Site is located on the southeastern edge of Broughton Island off the east coast of Baffin Island, Nunavut. The FOX-5 Station is about 2 km inland of Davis Strait approximately 9 km east of the community of Qikiqtarjuaq. The main DEW Line Station and Short Range Radar Station is situated on top of a hill, approximately 560 m above sea level and is accessible by an all-season road. A heated vehicle storage and POL facility is located on the coast nearby the community of Qikiqtarjuaq.

The terrain of Broughton Island consists of marine deposits near the coastal regions, till deposits in broad U-shaped valleys in the interior of the island and boulder-covered uplands in the vicinity of the main station. The terrain and drainage features are illustrated in Figures 1 and 2.

The uplands area around the station is covered with boulders derived from the underlying bedrock. There is a silty sand matrix between the boulders in many areas. The boulders are typically 0.3 to 1.0 m in size with some boulders greater than 2.0 m. The till deposits in the valleys typically consists of sand with some silt and gravel with some boulders and cobbles at the ground surface.

Drainage from the station area flows north-east towards the ocean and south-west towards the former station water lake.

There is a large valley west of the station area. Drainage from the valley flows northwards to the ocean. The drainage flows through a small lake approximately 3 km north of the road to the station. Community members of Qikiqtarjuaq have stated that this lake may be a source of drinking water for the community in the future. The southern portion of the valley flows towards the community's primary water supply reservoir 2 km west of the community.

ALTERNATIVE LANDFILL SITES

Landfill G

Proposed Landfill G is at the upper station area northwest of garage as shown on Figure 1.

The area is undisturbed ground which is covered with boulders (felsemeer bedrock). Photos 1, 2 and 3 illustrate the ground surface. Interstices between the boulders are filled with silty sand in portions of the area. There are some large boulders (bedrock fragments) in the area up 2 to 3 m size.

Drainage from the area flows toward the north and northeast. Ultimately the drainage flows down 560 m to the ocean which is 1 km north of the proposed landfill site.

The large boulders and boulders frozen in permafrost will make it difficult to excavate a landfill key trench in this area for a Tier II landfill. Boulders with voids between them will have to be removed below the perimeter berms of a demolition debris landfill.

Landfill K

Proposed Landfill K is located at the middle site, just inside the DND reserve north of the road from the community to the station as shown on Photo 4 and Figure 1.

The area is undisturbed ground which consists of frost sorted till with cobbles and boulders within a sand matrix. There are some open boulder areas that do not contain sand matrix. Most of the boulders are less 1 m in size; however there are some 2 m and 3 m boulders. Bedrock is expected to be shallow in the area; as there are outcrops to the north of the area. Small areas of standing water were present during the site visit. A testpit excavated to a depth of 0.5 m in the centre of area encountered sand and with some gravel and a trace of cobbles. The ground was very wet at 0.3 m and seepage was observed at 0.5 m.

The area is on a topographic high; thus it is on drainage divide. A portion of the area drains to the southwest and ultimately to the west down along the road towards Qikiqtarjuaq, and a portion of the area drains to the south and then easterly down towards the middle valley. The site is approximately 1 km from a stream that flows towards the lake that the community considers a secondary water supply. The proposed landfill site is approximately 3.5 km from the lake.

A 300 m long access road is required from the main road into the area. The access road would be outside of the DND reserve.

Landfill L

Landfill L is located in the middle valley 200 m south of the road to the station as shown in Figure 1 and Photo 8.

The area is undisturbed ground at the foot of a large hill. It is covered with a till deposit which consists of frost sorted linear and polygonal features of cobbles and boulders with sand and silt in between the cobbles and boulders. Most of the boulders are less than 0.5 m in size. The area had some standing water at the time of the site investigation. A 0.5 m deep testpit was excavated in the center of the area encountered gravelly sand with a trace of silt and cobbles.

Drainage from the area flows north towards the road, and then flows west along the road ditch towards the stream that flows to the community's secondary water supply lake. The distance from the proposed site to the stream is 400 m. The secondary water supply is approximately 3.5 km from the proposed site. Some drainage may flow onto the landfill from the hill above it; however, most of up-slope drainage is diverted around the area by the natural topography.

A 200 m long access road is required from the main road into the area. The ground is relatively wet and will require a road embankment for trafficability.

Landfill M

Proposed Landfill M is located at the Upper Station Area in an old borrow area southwest of the Main Landfill as shown in Figure 1. The landfill could be located in the old borrow or west of the borrow area in undisturbed ground.

The soils in the borrow area consist of sand with a trace of gravel. Three testpits (0.5 m to 0.6 m deep) excavated in the borrow area encountered medium to fined grained sand with a trace of gravel. The sand was moist to very wet. Seepage was encountered 0.2 m below the surface in two of the testpits. Standing water was present in the area as illustrated in Photos 11, 12 and 13. The native ground to the west of the borrow area has boulders within a sand matrix. It is anticipated that sand is present below the boulders similar to that observed in the old borrow area.

Drainage into the area is limited to the catchment area between the proposed site and the station road to the south and a small area to the west. Drainage from the area flows north towards the main landfill.

DISCUSSION

A landfill is required at the middle site to avoid a haul to the station area for the debris as well as fill material to construct the landfill. Landfill K or L are both suitable locations however Landfill K is considered to be a better location due to the fact that it is on topographic high; thus receives little run on. Drainage from the area flows both away from and towards the community's secondary water supply. The drainage towards the secondary water supply could be minimized by grading the top surface of the landfill towards the west and directing the flow from the landfill along a ditch of the landfill access road.

CLOSURE

We trust this is the information that you require at this time.

Yours truly,
EBA Engineering Consultants Ltd.

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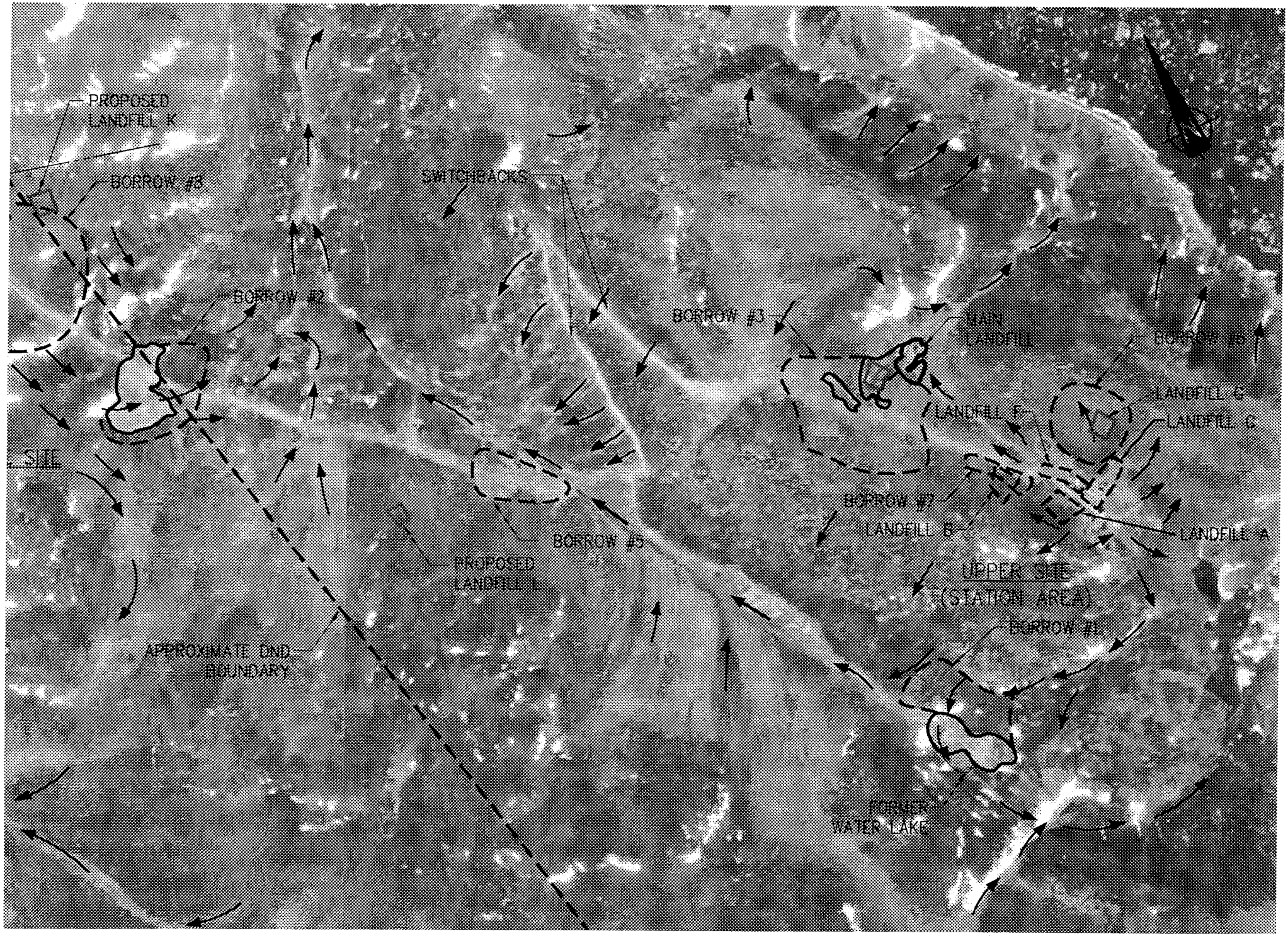

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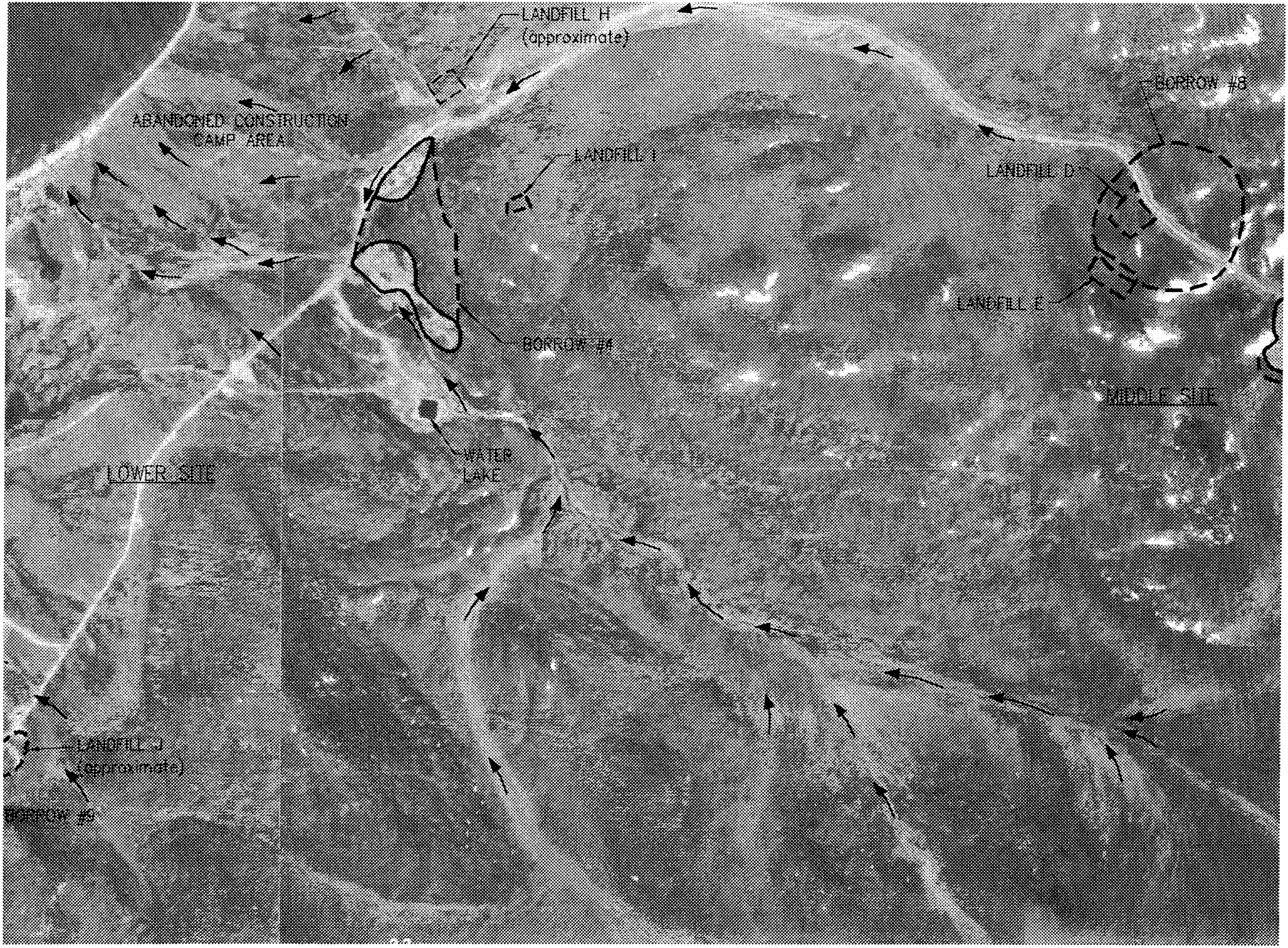

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