7.6. NOISE

Hatch & Associates Ltd. (Hatch) was commissioned by Bennett to complete a noise impact study in accordance with the requirements of MOEE noise guidelines

The "Acoustic Impact of Proposed Thermal Treatment Plant" report conducted by Hatch was completed in October 2001. This report can be found as separate Volume X. The facility design has changed slightly between when this report was completed and present time, however those changes do not impact the findings of the referenced report.

During review of the Draft Environmental Assessment report, a comment was received from the MOEE that suggested an assessment of traffic noise be included in the noise impact assessment. Based on this comment, Bennett decided to have Hatch conduct an assessment that would examine the impacts of traffic noise, based on the traffic analysis "Traffic Impact Assessment" (McCormick Rankin Corporation, 2001). The "Traffic Noise Impact" was completed in March 2002, results of which are also discussed in this section.

The noise impact assessment was conducted and prepared in compliance with the Approved Terms of Reference for the Environmental Assessment. The current section describes:

- Effects on ambient noise levels, and
- Traffic noise impact.

7.6.1. Effects on ambient noise levels

In Section 3.x, existing ambient noise levels were presented and discussed. The existing noise levels helped determine what Class designation was appropriate for the area, and was found to be Class 2.

"Class 2 Area" means an area with an acoustical environment that has qualities representative of both Class 1 & Class 3 Areas, and in which low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 2 Areas, will typically be realized as early as 19:00 hours.

Other characteristics, which may indicate the presence of a Class 2 Area, include:

- Absence of urban hum between 19:00 and 23:00 hours;
- Evening background sound level defined by natural environment and infrequent human activity and;
- No clearly audible sound from stationary sources other than from those under impact assessment.

7.6.1.1. Prediction Model

A regulated model was used for the assessment of potential effects on ambient noise levels. The model used to predict sound levels at the receiver location in the community (i.e. closest residence) is a spreadsheet model based on CAN/CSA Standard Z107.55 "Recommended Practice for the Prediction of Sound Levels Received at a Distance from an Industrial Plant". The model assumes that the entire facility can be modelled as a point source located at the building center. The acoustic (noise) centre of the plant

was chosen to be the location of the main process discharge stack, which is close to the building corner nearest the residence.

This standard encompasses geometric spreading and atmospheric absorption and does not adjust for ground effect. As such, it is more conservative than another model used by the MOEE - ISO 9613(2), which incorporates all three effects. So the CAN/CSA model is the more conservative model for the proposed facility, and therefore was used for the noise assessment.

7.6.1.2. Methodology

The facility design is still in the process of refining technical details, such as the suppliers of proposed equipment. It is known what kind of equipment is required, and roughly how many of each equipment piece will be needed. This information was used for the noise assessment.

The sound power levels (please refer to Glossary for explanation) of all the outside sources of noise are grouped together to look at the total noise contribution of the proposed facility. Most of the outside noise sources are fans for which the supplier sound power data was calculated.

It was assumed that the entire building interior sound level was at 90 dBA, the Ministry of Labour (MOL) regulation limit. It is likely that certain areas within the facility will actually be lower. This reverberant level is used to determine the sound radiating through the building walls, acoustic louvers and other openings. The transmission loss of the single skin metal walls is used as a worst case since it had not yet been decided if insulated or un-insulated walls would be installed. Insulated walls would increase the transmission loss and lower the exterior noise levels given off. While the buildings are supposed to be completely closed in, an allowance for leaks is included. Leaks are assumed to be 0.2% of the total building surface and thus represent quite well sealed buildings. This is achievable in a well-sealed industrial building.

7.6.1.3. Results

Conservative Measures

The following measures were implemented in the noise impact assessment to add an extra level of security in the findings of the report:

- Although it is expected that the material delivery doors will be kept closed or that seals will be placed around the truck bodies, three material delivery doors are assumed fully open; material delivery doors normally will only be open during the delivery of the material,

- The CAN/CSA standard used for this assessment encompasses geometric spreading and atmospheric absorption and does not adjust for ground effect (which would lessen noise),

- Assumed that interior noise level is constant at Ministry of Labour regulation.

The ID fan and the Vent stack fans will require silencers. Unless it can be shown that the sound level inside is acceptably below 90 dBA, all louvers facing the residences will have to be acoustic louvers.

Louvers and doors will have to be re-evaluated during the application for a Certificate of Approval, based on estimated indoor sound levels at their locations. The facility details are likely to be modified during design; therefore it is premature to do a detailed analysis at this stage.

The results of the automatic noise monitoring show that a design level of 45 dBA should be used for the proposed facility. The acoustic model shows that a sound level of 43 dBA at the nearest residence is achievable without major noise control design. Only minor noise controls such as outlet silencers, which may be required for the ID and vent stack fans, acoustic louvers and a maximum average reverberant sound pressure level of 90 dBA inside the building is required. If the ISO 9613(2) prediction model were used, it would give even lower values.

The predicted level for the plant meets the design goal of 45 dBA at the nearest residence without including the effect of the intervening vegetation, which could provide a 5 dB additional noise reduction.

Appendix 11, sub-Appendix A summarizes the model calculations.

7.6.1.4. Mitigation Measures and Net Effects

It is suggested that attention be paid to indoor sound levels to ensure they are acceptable from an occupational standpoint. This will require fan silencers, lagging and interior treatment of the building. Hatch recommends designing the interior to meet 85 dBA in order to protect employee hearing.

The overall sound power levels used in the model should be specified as a maximum permissible level during the purchase of the fans. Silencers should be installed to meet the maximum permissible sound power level.

The predicted level for the plant meets the design goal of 45 dBA at the nearest residence without including the effect of the intervening vegetation, which could provide a 5 dB additional noise reduction.

7.6.2. Traffic Noise Impacts

7.6.2.1. Methodology

Traffic noise impacts were investigated based on a comment from a government reviewer who requested it. This section of the report will examine the traffic noise impacts based on the traffic analysis carried out for the Environmental Assessment by McCormick Rankin Corporation.

The following excerpt from the traffic impact report outlines the expected traffic from the plant:

> "The heavy vehicle traffic that will transport material to and from the site is the primary concern of local residents. Although the majority of incoming material is expected to arrive from the south along Highway 11, as much as 15% of the incoming material may come from either the north along Highway 11 or from the east along Highway 66. The proponent's current intent is to dispose approximately 15% of the treated material at a licensed landfill in Sarnia. The Town of Kirkland Lake is not opposed to depositing up to 40% of the treated material as fill in the surrounding industrial park along Archer Drive. Given that there is less certainty with respect to the destinations of the balance of

the treated material, three scenarios were evaluated to ensure that future traffic impacts are not understated on the alternative approach routes to the proposed thermal treatment facility.

Bennett Based on the anticipated routes to and from the site, the traffic analysis has identified the incremental increase in heavy vehicle traffic (generated by the treatment facility) along the following sections of the regional highway network:

- Highway 11 north of Highway 66
- Highway 11 between Highway 112 and Highway 66
- Highway 11 south of Highway 112
- Highway 66 between Highway 11 and Highway 112
- Highway 66 between Highway 11 and Archer Drive
- Highway 66 east of Archer Drive
- Highway 112 between Highway 11 and Highway 66"

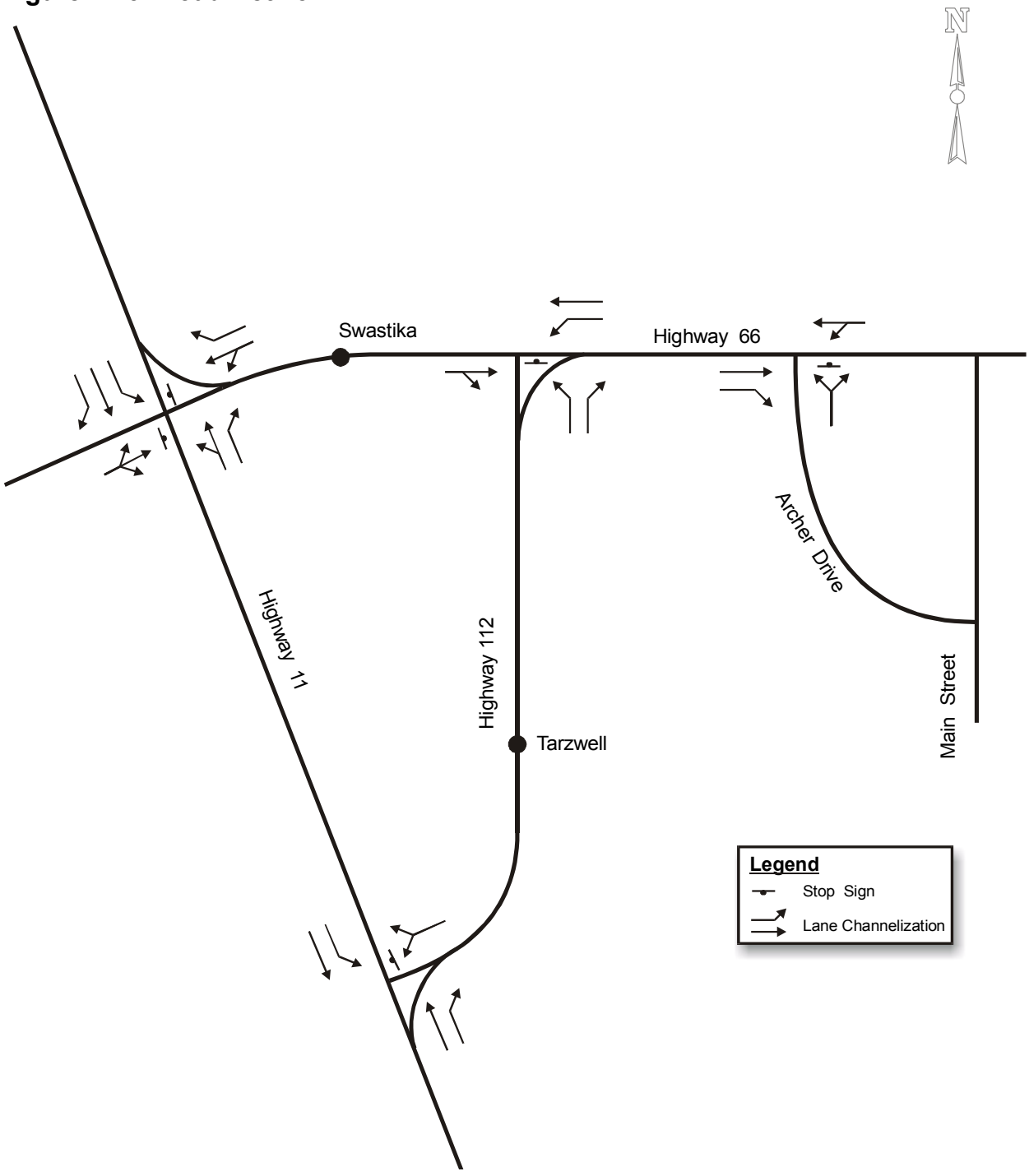
Sound levels are predicted at 15m from the road centreline assuming the following:

- Speed limit of 90 km/h on all roads shown – Figure 7-19 (this assumption affects the predicted sound levels, but should have little effect on the change in sound level),

- Existing traffic from trucks are half medium (2 axles) and half heavy (3 or more axles),

- Facility traffic is taken as the maximum of the three traffic scenarios examined in the McCormick Rankin report and is all heavy trucks.

Figure 7-19 Road Network



Equivalent sound levels are calculated for the morning and afternoon peak hours and the 24-hourly average traffic using an adaptation of STAMSON, the MOEE traffic noise prediction program.

Most truck traffic to and from the plant is expected to arrive and depart during the daytime. However, it is possible that some trucks, especially those travelling greater distances, could arrive at night. So long as the traffic from the facility drops off at night more than the background traffic, the 24-hour average should be a reasonable, or indeed an over-estimate, of the actual impact at night.

The largest sound level increase is predicted to occur on Highway 112, heading south out of town and described:

"Although the highway does not pass directly through any communities per sé, there are small pockets of residential and commercial uses between Highways 11 and 66."

7.6.2.2. Results

Conservative Measures

Eight truck movements per hour were assumed during the night, although deliveries at night will only take place when it cannot be avoided.

Traffic Impact Report is based on facility traffic being doubled the average expected.

The sound level analysis shows that the largest sound level increase is predicted to occur on Highway 112, heading south out of town and described as:

"Although the highway does not pass directly through any communities per sé, there are small pockets of residential and commercial uses between Highways 11 and 66."

The predicted average traffic sound level increase is 2 dB and the peak hour increase is 3 dB (assuming the peak hour has double the average facility traffic). A 2-3 dB increase in sound level is generally the smallest increase that can be noticed. All other road segments are predicted to have 1.6 dB increase or less, which is minor. Please see Table x for dB increase information.

7.6.2.3. Mitigation Measures and Net Effects

Bennett has chosen the routes, which will avoid most residential areas and will attempt to limit night time traffic. It is concluded that there is need for further mitigating measures. However, it is agreed that Bennett will do its best to schedule truck arrival during the daytime.

Table 7-33 Average Hourly Traffic – dB Increase

Location	Existing		2005 Background		Site Traffic (Trucks) scenario S			Leq (dBA) at 15m from road centerline assuming 90 km/h traffic		
	Truck Volume	% of Total Volume	Truck Volume	% of Total Volume	1	2	3	2005 Background	Max. Scenarios : 1,2,3	dB increase
Hwy 66										
Btw Hwy 11 and Swastika	5	6%	8	6%	0	1	2	62	63	0.9
Btw Swastika and Hwy 112	10	6%	12	6%	0	1	2	64	65	0.6
Btw Hwy 112 and Archer	10	5%	14	5%	4	3	4	65	66	0.8
Btw Archer and Kirkland Lake	18	8%	20	8%	0	1	0	66	66	0.2
Hwy 11										
North of Hwy 66	31	19%	39	19%	0	1	2	68	68	0.3
Btw Hwy 66 and Hwy 112	27	30%	30	30%	0	0	0	66	66	0.0
South of Hwy 112	23	18%	28	18%	3	2	2	66	67	0.6
Hwy 112										
Btw Hwy 11 and Tarzwell	3	6%	5	6%	3	2	2	60	62	2.0
Btw Tarzwell and Hwy 66	5	6%	6	6%	3	2	2	61	63	1.5

Peak background traffic assumed 1/10 of totally daily
Peak hour facility traffic twice average over 10h day
Average hourly traffic is total daily divided by 24h
L_{eq} from STAMSON at 15m, 90 km/h adjusted for hourly volume of cars, medium and heavy trucks.

As demonstrated above the Noise Impact Assessment was completed pursuant to the approved Terms of Reference describing the potential eeffects on ambient noise levels in the area. For the further detail on noise impacts please see Appendix 11, Noise and Noise Traffic Impact Assessment.