UMA Engineering Ltd.
Engineers and Planners

1479 Buffalo Place, Winnipeg, Manitoba, Canada R3T 1L7
Telephone: (204) 284-0580 Fax: (204) 475-3646

Our File: 41 01 D265 079 01 01

October 20, 2000

Manitoba Conservation
Winnipeg Region
123 Main Street, Suite 160
Winnipeg, MB
R3C 1A5

Attention: **Mr. Randy Webber**
Environmental Officer

Dear Sir:

Reference: **Remedial Action Plan – Sewer Relief for the Boyle/Syndicate Combined Sewer District City of Winnipeg, Water and Waste Department**

UMA Engineering Ltd. has been retained by the City of Winnipeg, Water and Waste Department to provide Professional Engineering Services for the design and contract administration of sewer relief/separation works for the Boyle/Syndicate Combined Sewer District. The following letter provides a brief overview of the background, project works and anticipated remedial measures that will be carried out over the course of construction.

1.0 BACKGROUND

The Boyle/Syndicate Combined Sewer District (CSD) is a 92 hectare catchment area that is bound by Main, Austin, Granville, Meade and Argyle Streets to the west, the Red River to the north and south and Higgins Avenue to the east.

The primary objective of the project is to upgrade the level of protection against basement flooding from summer rainstorms in the Boyle/Syndicate CSD to current City design objectives. The preferred alternative for complete district relief is a balance of land drainage sewer separation and combined sewer relief.

Starting in the winter of 2000-2001 the City of Winnipeg will initiate phased construction of the relief/separation works, beginning with the installation of new land drainage sewers, gate chamber and river outfall on Disraeli Street (see Drawing 1).

Subsurface contamination is known to be present in the vicinity of the former coal gasification plant on the Centra Gas site, located immediately east of the Disraeli Overpass and Bridge (see Drawing 2). Off-site migration from the property appears to have occurred through the permeable alluvial deposits present on the north and west sides of the site. UMA has completed supplementary environmental/geotechnical investigations in the vicinity of the new sewer alignment and outfall structure on Disraeli Street to determine the nature, extent and subsequent impacts the contamination may have on the proposed relief/separation works.

2.0 SITE INVESTIGATIONS

Results of previous environmental site investigations completed by CH2M Hill Engineering Ltd. (1993-1994) and Agra Earth & Environmental (1995-2000) have identified hydrocarbon impacted soil, sediment and groundwater in the vicinity and downgradient (north and northwest) of the Centra Gas property located at 35 Sutherland Avenue in Winnipeg. The source of on-site and off-site hydrocarbon impacts has been attributed to historical coal gasification operations on the property. Based on data presented in the CH2M Hill reports, contaminants of concern have been identified to include polycyclic aromatic hydrocarbons (PAHs) in the soil, river sediments and groundwater and metals in the groundwater both on and off the property. Results of the CH2M Hill and Agra investigations were obtained for review from the Manitoba Conservation Library and Centra Gas/Manitoba Hydro corporate files.

As a result of this review, supplementary subsurface environmental investigations were completed by UMA in September 2000 to determine the nature and magnitude of potential hydrocarbon impacts in the areas proposed for sewer relief/separation works. Drawing 2 illustrates the location of environmental/geotechnical test holes completed on Disraeli, Gladstone and Annabella Streets, proximate to the proposed alignments. The zone of subsurface impact as interpreted from the CH2M Hill, Agra and subsequent investigations by UMA is illustrated on Drawing 2.

2.1 Soil Quality

Soil samples selected for laboratory determination were based on visual observations, vapour screening results and the requirement to characterize soil that would be impacted at depth along the proposed sewer and outfall alignments. All samples submitted for laboratory determination were analyzed for petroleum hydrocarbon constituents, including volatile hydrocarbons, extractable hydrocarbons and PAHs.

Analytical testing completed as part of the supplementary investigations identified trace concentrations of polycylic aromatic and extractable hydrocarbons in the soil from test holes located near the north end of Disraeli Street. Results were compared against the Canadian Environmental Quality Guidelines (CCME, 1999) for Industrial Land Use. All results were found to be either less than the method detection limit or well below the relevant CCME Guidelines.

2.2 Groundwater Quality

Representative groundwater samples were collected from three monitoring well locations (TH-1, TH-2 and TH-4). All samples were submitted for chemical determination of PAHs and metals. Samples collected from TH-1 and TH-4 were representative of the shallow groundwater conditions within the alluvial sands located between 4.5 m and 6.0 m. The sample from TH-2 is representative of the deeper groundwater conditions at the clay-till interface located between 9.0 m and 10.5 m.

Results were compared against the Canadian Environmental Quality Guidelines (CCME, 1999) for the protection of Freshwater Aquatic Life. All results were found to be either less than the method detection limit or well below the relevant CCME Guidelines.

2.3 River and Sediment Quality

Characterization of the river water and sediments within the area proposed for the sewer (north of Disraeli Street) was not completed as part of UMA's supplementary field investigations. However, information obtained from the CH2M Hill and Agra investigations indicate PAH concentrations are above the CCME Probable Effects Level (PEL) in the river sediments north and northwest of the former coal gasification plant. CH2M Hill reported the impacted zone to be approximately 300 m in length along the shoreline and extending at least 30 m into the river near the end of Disraeli Street (see Drawing 2). Furthermore, Agra reported the depth of impacted sediments along the shoreline to extend to a depth of 1.5 m.

Results of the river water analyses completed by CH2M Hill (1993) found no detectable levels of PAHs in the river. CH2M Hill suggested that the PAHs are bound to the organic carbon in the sediment and are not present at levels of concern in the dissolved phase.

3.0 PROPOSED CONSTRUCTION WORKS

The proposed relief/separation works likely influenced by the interpreted zone of hydrocarbon contamination include:

- 100 m of 1350 mm diameter storm sewer along Disraeli St. (average invert depth of 7.5m below grade);
- the gate chamber at the corner of Disraeli St. and Rover Ave.;
- 20 m of 1650 mm diameter outfall pipe to the Red River, north of Disraeli St.; and
- installation of erosion protection along the river bank.

Drawing 3 illustrates a plan and cross sectional view of the proposed works at the north end of Disraeli Street. It is likely that the majority of the new sewer will be completed by trenchless (tunnel) construction methods due to the permeable alluvial soil conditions located at the north end of Disraeli Street. Groundwater dewatering will therefore be an

integral part of the construction process, preventing groundwater flow into the excavation over the anticipated construction period (January to April, 2001).

Construction of the sewer, gate chamber and outfall structure will involve the direct excavation and removal of soil and sediments potentially impacted with hydrocarbons.

3.1 Soil and Sediment Management

The excavation and removal of soil and sediments is to be scheduled over the winter months and will include impacted soils removed during sewer tunneling, construction of the gate chamber and installation of the river outfall.

All hydrocarbon impacted soil and river sediments removed as part of the construction works will be transported directly to the Mid-Canada soil treatment facility, located in Ile Des Chenes, Manitoba. No additional remedial excavation will be completed as part of this project.

A combination of field screening and analytical testing will be used to characterize the excavated soil scheduled for off-site disposal. Field samples will be collected directly from the excavated material and screened for hydrocarbon vapours using a photoionization detector. Composite samples will be collected for laboratory analysis. Sample compositing will be completed in the field by combining five representative aliquots from every 50m^3 of excavated soil. The composite samples will be analyzed for PAH's and extractable hydrocarbons.

Excavation of the river sediments will be completed primarily above the winter water level on the Red River (normal 221.7m+/-) and will therefore cause minimal disturbance to aquatic life. Mitigative and design considerations to protect against the re-suspension of sediments during and following construction activities will include:

- Placement of a temporary coffer dam, to the winter water level, along the north boundary of the construction zone to ensure sediments are contained with the excavation area;
- Placement of geo-textile material along the base of the river excavation, to prevent re-suspension of sediments during summer and winter water levels;
- Placement of engineered rip-rap materials beyond the point of discharge of the outfall pipe, to prevent hydraulic scouring of the river sediments during heavy rainfall events; and
- Placement of riprap flush with existing bank profiles, to minimize disturbance of adjacent riverbanks by river flows.

3.2 Groundwater Management

Based on information presented by CH2M Hill and hydrogeologic testing completed by UMA (September 2000), it is estimated that the alluvial deposits on the north end of Disraeli St. will produce an average discharge of 40 – 60 litres per minute. Groundwater

extracted from dewatering will be discharged directly to the existing City of Winnipeg sanitary sewer connection on Disraeli Street. See attached letter from Ms. Dorothy Steele.

Based on the anticipated length of construction period and the potential variability of groundwater quality, UMA proposes to implement an ongoing groundwater discharge monitoring program. This will include the collection of representative samples from the discharge stream on a weekly basis. Samples will be analyzed in accordance to the City of Winnipeg, Section 5, Sewer Use By-Law requirements.

3.3 Air Quality Monitoring

The air monitoring program has been designed to identify potential airborne risks to on-site workers. The information it provides will be used to modify work procedures and keep risks at an acceptable level. The air monitoring program will be conducted during the time period involving the excavation of potentially impacted soil and sediments and is expected to take about twelve weeks to complete.

The following indicator chemicals and action levels will be used to monitor activities around the site and ensure that there is no overexposure to workers.

Naphthalene

Napthalene will be one of the key target parameters as it represents one of the highest observed concentrations. Reports of slight to moderate napthalene-type odours have been documented by UMA during the test hole investigations along the proposed sewer alignment on Disraeli Street. If naphthalene is detected above the prescribed action level it is likely that other parameters will also be present above acceptable levels.

- Recommended Action Level: 10 mg/m^3

Benzo(a)anthracene

Benzo(a)anthracene represents one of the highest inhalation cancer rates for the contaminants detected and therefore will be used as an indicator compound for all carcinogenic constituents on-site. If benzo(a)anthracene is detected above the prescribed action level it is likely that other carcinogenic parameters will also be present above acceptable levels.

- Recommended Action Level: 0.005 mg/m^3

Gases and Vapours

Elevated levels of soil vapours are anticipated within the tunnel excavation proposed for installation of the sewer pipe along the north end of Disraeli Street and during construction of the gate chamber. As part of the construction activities, the contractor

will be required to provide positive air flow into the excavation area. A photoionization detector (PID) will be on-site to monitor potential hydrocarbon vapours.

- Recommended Action Level: 10 PID units (sustained for 15 minutes)

Daily exposure samples will be collected during the first week of tunnel excavation in the impacted alluvial soil and river sediments. Consideration will be given to rush analysis during this time, to quickly build up a data base that will be used to set the work procedures and level of personal protection equipment (PPE) needed at the site. Additional samples will be collected on a weekly basis during subsequent weeks of the project.

Samples will be collected with pumps over an eight hour period and the contaminants collected in sampling tubes. They will then be analyzed according to NIOSH method #5515 (modified for GC/MSD) by a certified laboratory. Non-specific organic vapour analyzers, such as photoionization detectors, will be used to monitor ambient air quality within the working area on a daily basis.

Based on the historical analytical results of the soil samples collected throughout the site and the intrusive nature of trenching and excavation activities, the chemical exposure hazards are expected to be moderate to low. Therefore, trenching and excavation will be initiated using Level D protection. Level D protection consists of the following equipment:

- Tyvek coveralls (or the equivalent);
- steel-toed work boots;
- hard hat, required when heavy equipment is being used; and
- ANSI-approved safety glasses (or equivalent).

Monitoring of the work area will be conducted to determine if field conditions warrant an upgrade in health and safety procedures. Levels of PPE will be adjusted upwards to Level C in the event that an action level is exceeded. Level C protection will consist of the following equipment, in addition to the equipment listed above for Level D:

- an air purifying respirator (NIOSH-approved); and
- organics, dust and pesticide respirator cartridges (MSA cartridges GMA-H, GMC-H, GMC-S, or equivalent).

All personnel who may be required to wear a respirator during any phase of the site activities shall require appropriate training in the use of air-purifying respirators and an appropriate medical examination. Each person assigned a respirator will be responsible for maintaining and inspecting the assigned respirator before and after use.

If you have any questions or concerns regarding this project or proposed remedial actions, please contact the undersigned at 284-0580 or by fax at 475-3646.

Yours truly,

UMA ENGINEERING LTD.

Larry Bielus, M.Sc., P.Eng.
Project Manager
Earth and Environmental Division

AP/pmb
Attach.
00102002.pmb

cc: Dave Moerman, City of Winnipeg, Water and Waste Dept.
Brad Morton, UMA Engineering Ltd.

THE CITY OF WINNIPEG

Water and Waste Department
Laboratory Services Division
2230 Main Street
Winnipeg, Manitoba
FAX: (204) 339-2147

-D265-079-03-01

L. Sadlier
B. Morton
cc: A. Passalis
Reg - Gen. File

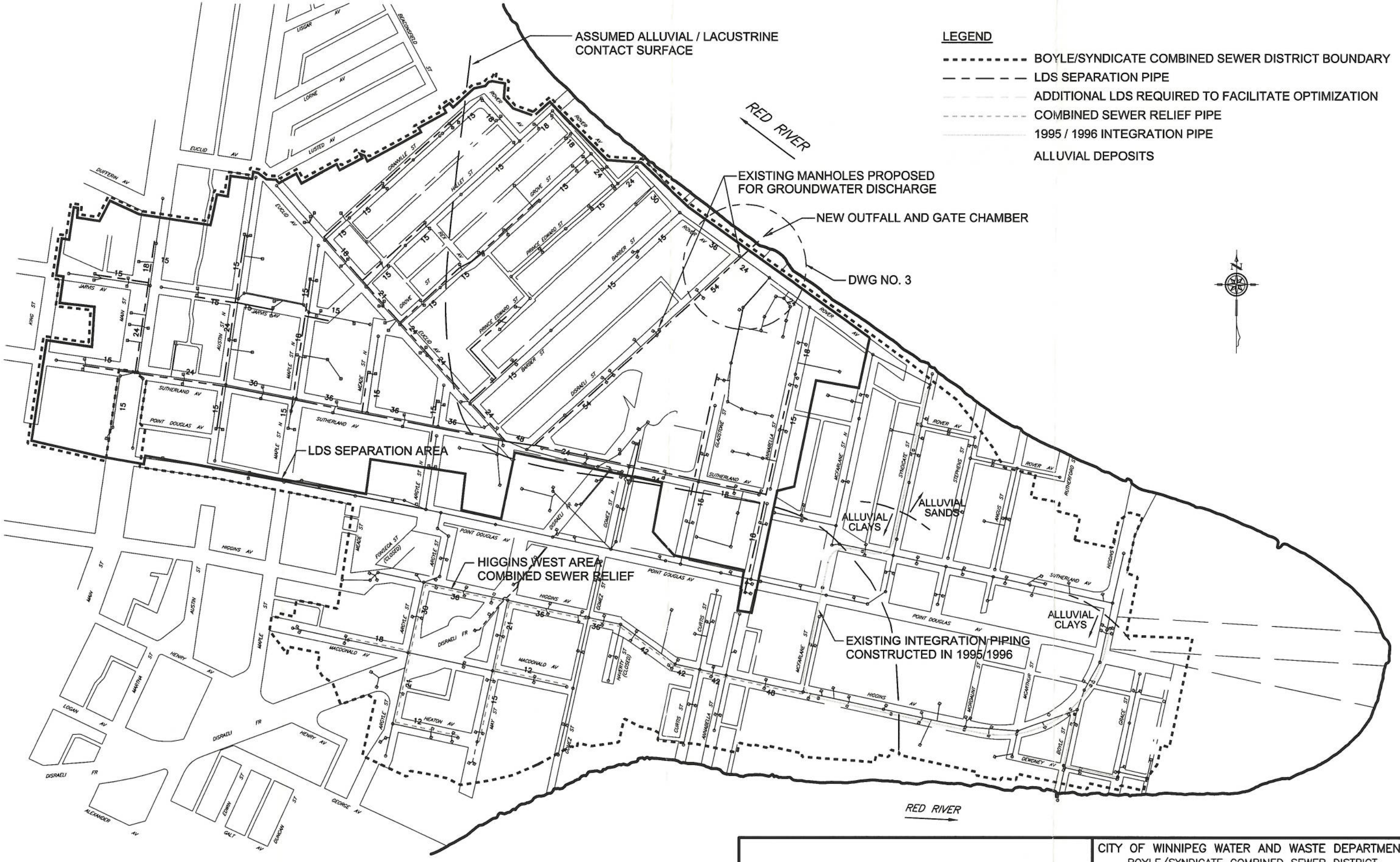
Fax

To:	Andrew Passalis, E.I.T.	**From:**	Dorothy Steele
Fax:	475-3646	**Pages:**	1
Phone:	284-0580	**Date:**	10/11/00
Re:	Proposed Discharge of Groundwater from Dewatering Boyle/Syndicate Combined Sewer District	**CC:**	Dave Moerman

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

Please be informed that the groundwater extracted during the tunnel excavation for the installation of new sewer pipe along Disraeli Street can be discharged directly to the wastewater manholes illustrated in Figure 1 of you facsimile transmittal dated Oct. 2, 2000. The groundwater can be discharged to the wastewater system, at a maximum pumping rate of 20gpm, if the groundwater meets the criteria listed in Section 25, Part 5 of the City of Winnipeg Sewer By-law 7070/97. In order for the groundwater to be discharged to the wastewater system, the concentration of naphthalene in the groundwater must be less than 20 ug/L. According to the analytical data you forwarded to the writer, the concentration of naphthalene in TH-1 appears to be at least 9.5 ug/L.

Please contact the writer at 986-4813 if you have any questions concerning the above.

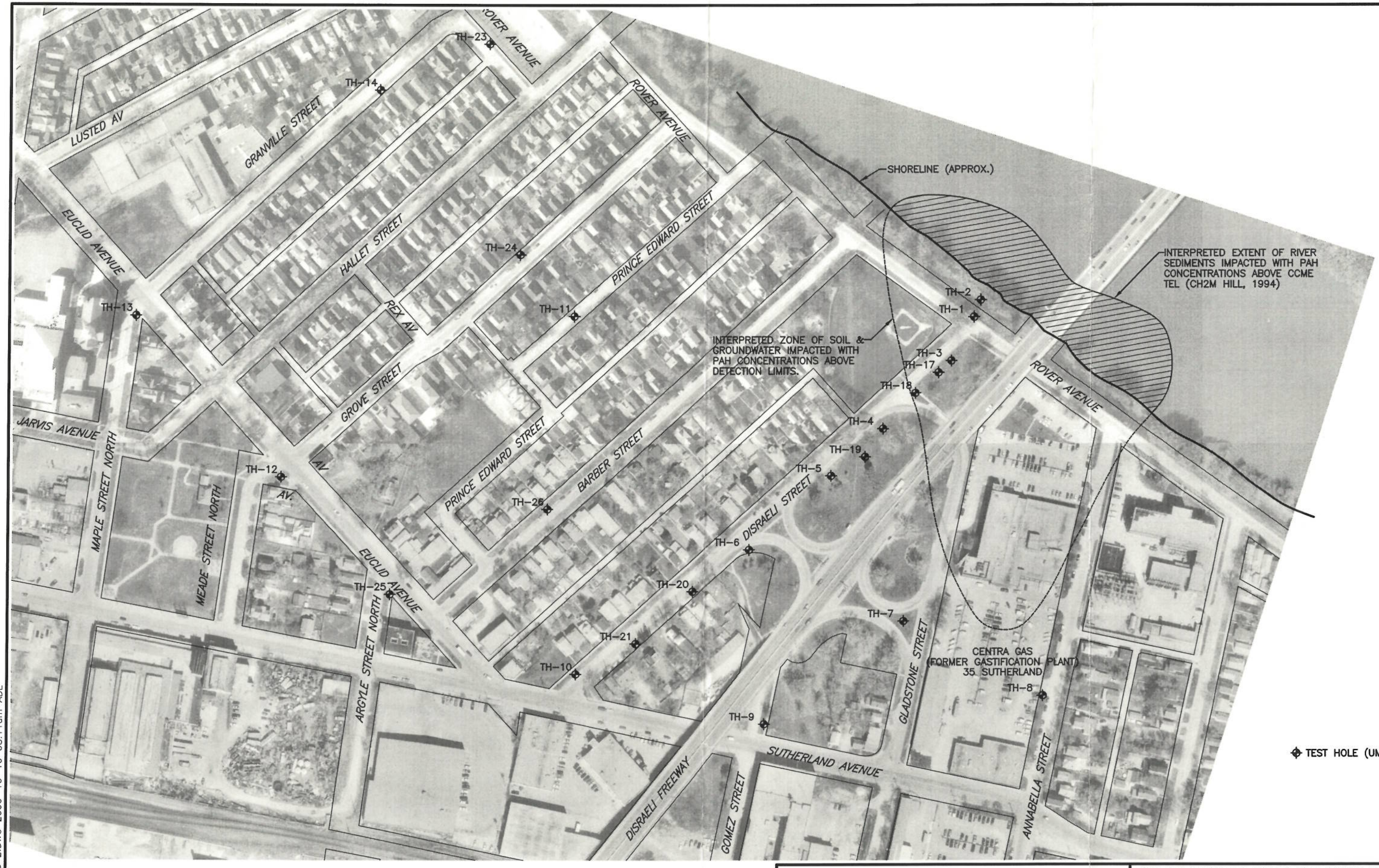


FILE: PAH IMPACTS 1.DWG 2000-10-12 2:39pm ADL

UMA Engineering Ltd.
Engineers and Planners
1479 Buffalo Place, Winnipeg, Manitoba, Canada R3T 1L7

CITY OF WINNIPEG WATER AND WASTE DEPARTMENT
BOYLE/SYNDICATE COMBINED SEWER DISTRICT

TITLE:	LAND DRAINAGE SEWER OPTIMIZATION		
JOB No.	D265-079-02-01	DATE:	OCTOBER 10, 2000
SCALE:	1:5000	DWG. No.	1
CHECKED:			

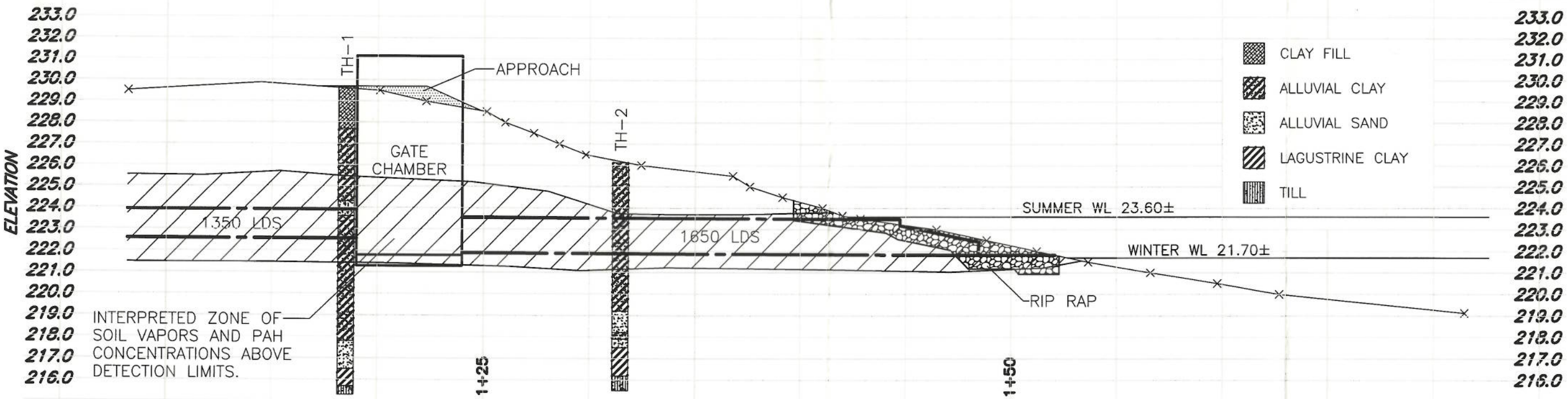


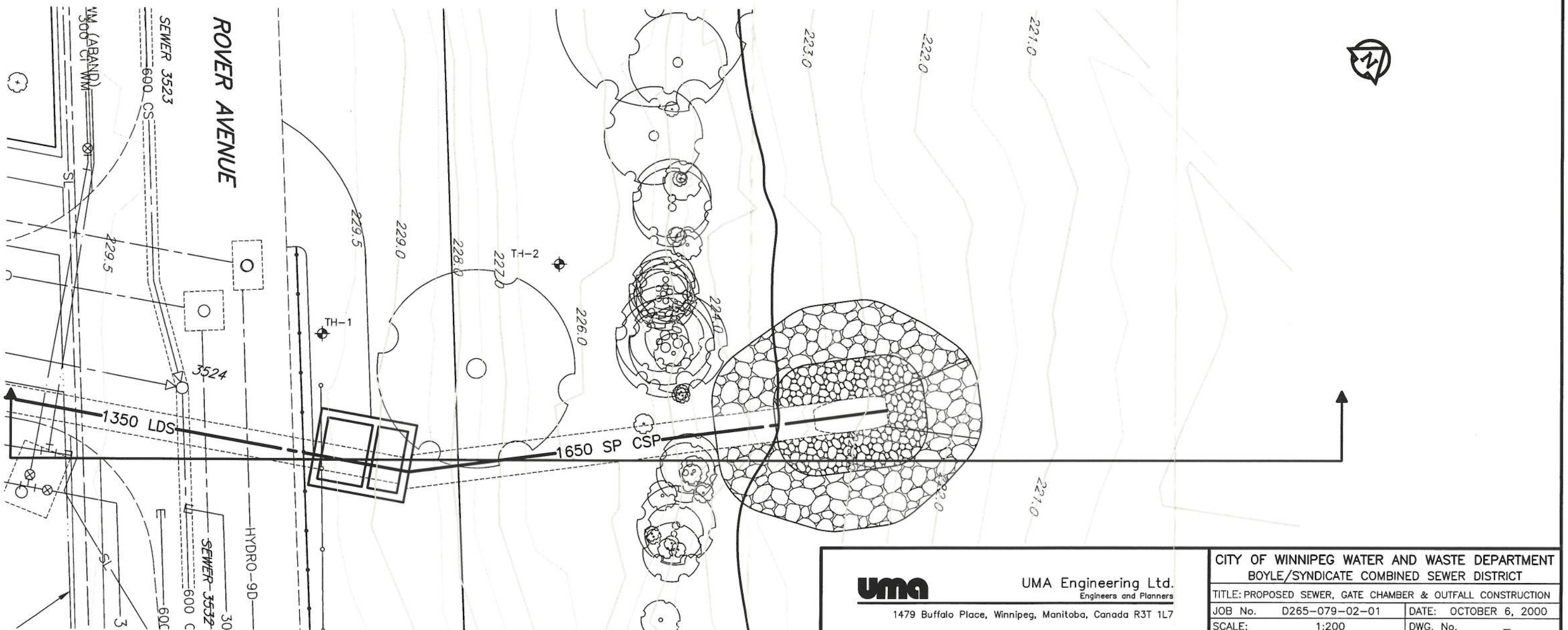
FILE: PAH IMPACTS 2.DWG 2000-10-10 08:11am ADL

UMA Engineering Ltd.
Engineers and Planners
1479 Buffalo Place, Winnipeg, Manitoba, Canada R3T 1L7

CITY OF WINNIPEG WATER AND WASTE DEPARTMENT
BOYLE/SYNDICATE COMBINED SEWER DISTRICT

TITLE: INTERPRETED ZONES OF PAH IMPACTS	
JOB No. D265-079-02-01	DATE: OCTOBER 6, 2000
SCALE: 1:2500	DWG. No. 2
CHECKED:	





FILE: PAH IMPACTS 3.DWG 2000-10-06 4:21pm ADL

UMA Engineering Ltd.
Engineers and Planners
1479 Buffalo Place, Winnipeg, Manitoba, Canada R3T 1L7

CITY OF WINNIPEG WATER AND WASTE DEPARTMENT
BOYLE/SYNDICATE COMBINED SEWER DISTRICT

TITLE: PROPOSED SEWER, GATE CHAMBER & OUTFALL CONSTRUCTION	
JOB No. D265-079-02-01	DATE: OCTOBER 6, 2000
SCALE: 1:200	DWG. No. 3
CHECKED:	