MUNICIPAL PROPERTY ASSESSMENT CORPORATION

MARKET VALUATION REPORT

ASSESSING SPECIAL PURPOSE PROPERTIES IN ONTARIO: MISCELLANEOUS CHEMICAL MANUFACTURING PLANTS

2016 Assessment Update

Valuation Date: January 1, 2016

MUNICIPAL PROPERTY ASSESSMENT CORPORATION

February 28, 2017

In January 2016, the Municipal Property Assessment Corporation (MPAC) published Market Valuation Reports for the following special purpose property types:

- aerospace manufacturing
- automotive assembly
- automotive parts
- chemical manufacturing
- food processing
- mining operations
- oil refineries
- pharmaceutical manufacturing
- pulp and paper mills
- sawmills
- steel manufacturing
- value-added wood products

These Market Valuation Reports share sector level market analytics and are intended to provide clarity and transparency as to how the above mentioned property types have been assessed for the 2016 province-wide Assessment Update.

Leading up to the Notice mailing in the fall, MPAC consulted with property owners, their representatives and municipalities in which special purpose properties are located.

During these consultations, additional data was provided that gave MPAC reason to make adjustments to our database and our analytics. This report has been updated to take into account any adjustments that were made following consultations with stakeholders.

If any further changes are made to this report following the return of the 2016 assessment roll, updates will be posted on mpac.ca.

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Acknowledgements

As part of the preparation of the Market Valuation Reports, MPAC consulted with affected property taxpayers, municipalities, and representatives. MPAC engaged the International Property Tax Institute as an independent facilitator to undertake industry-specific consultation sessions.

MPAC would like to acknowledge and thank all parties who participated in the consultation process through industry-specific forums.

We would also like to thank property owners who provided information submissions as part of MPAC's formal information request.

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Introduction

The Municipal Property Assessment Corporation (MPAC) – mpac.ca – is responsible for accurately assessing and classifying property in Ontario for the purposes of municipal and education taxation.

In Ontario, property assessments are updated on the basis of a four-year assessment cycle. The most recent province-wide Assessment Update was in 2016 when MPAC updated the assessments of Ontario's more than five million properties to reflect the legislated valuation date of January 1, 2016. Assessments updated for the 2016 base year are in effect for the 2017–2020 property tax years. Ontario's assessment phase-in program prescribes that assessment increases are phased in over a four-year period. Any decreases in assessment are applied immediately.

Achieving an accurate valuation of special purpose industrial properties, such as chemical manufacturing plants, for property tax purposes is challenging due to the size and specialized nature of the properties concerned and the fact that very few, if any, of them are bought, sold or leased in the market on a regular basis.

For that reason, it is important to ensure that the valuation methodology applied is capable of providing a realistic estimate of current value at the relevant valuation date and, in turn, enables all stakeholders to understand the valuation process and have confidence in the fairness and consistency of its outcome.

This Market Valuation Report (MVR) has been prepared for the benefit of MPAC assessors, property owners and their representatives, municipalities and their representatives, Assessment Review Board members, provincial officials, and the general public. MPAC reserves the right to amend the Market Valuation Reports as appropriate. Updates will be posted on mpac.ca.

The following definitions of "special purpose properties" may be helpful in reviewing this MVR:

- "A limited market property with a unique physical design, special construction materials, or layout that restricts its utility to the use for which it was built."[1]

- "A property that is rarely if ever sold in the market, except by way of sale of the business or entity of which it is part, due to the uniqueness arising from its specialized nature and design, its configuration, size, location or otherwise."[2]

[1] *Dictionary of Real Estate Appraisal, Fifth Edition* (Appraisal Institute, 2010).
[2] "Glossary," International Valuation Standards Council, last modified January 1, 2016, http:// http://www.ivsc.org/standards/glossary.

Special purpose properties are likely to have the following characteristics:

- They are unique in improvements, design, layout, size, construction materials and/or building services that facilitate one or a limited number of uses.
- Generally contain machines and machine fittings that are designed to facilitate one purpose.
- Adaptation to other uses is typically challenging, requiring significant alterations and rarely finding economically viable uses for all of the improvements.
- There are limited market possibilities, except as a going concern business.
- They typically have specialized building services.
- They tend to serve large market areas that are more regional, national or international in scope.
- The expansive geographic scope of these properties typically requires research of regional, national or international data to support a market value analysis.
- Understanding the "market" for special purpose properties also requires understanding of the industry in which it operates (i.e., the nature, condition and financial health of the potential buyers and sellers).

Special Purpose Business Property Assessment Review

MPAC's disclosure efforts support one of the key objectives of MPAC's 2013–2016 Strategic Plan to deliver fair and accurate 2016 assessed values and align with the recommendations made in the 2013 Ministry of Finance's *Special Purpose Business Property Assessment Review* (SPBPAR).

The SPBPAR highlighted issues regarding the assessment of specialized and unique types of business properties that are not commonly bought and sold and often involve complex assessment methodologies.

As part of the review process, feedback was gathered from municipalities, MPAC, the Assessment Review Board (ARB) and business taxpayer representatives. The recommendations outlined in the SPBPAR promote changes to improve the assessment of special purpose properties and, generally, the property assessment system in Ontario. Included in the recommendation are the three levels of disclosure outlined below.

Three Levels of Disclosure

There are three levels of disclosure.

Level	Title	Description
1	Methodology Guides	Comprehensive guides that explain assessment methodology
2	Market Valuation	Comprehensive guides that explain how methodology was applied to value properties for the 2016 Assessment Update
3	Property Specific Valuation Information	Detailed information that is available through secure access only or upon written request from taxpayers, representatives and municipalities

There are no discrete current values shared at the first two levels of disclosure.

The Property Specific Valuation Information for each of the chemical manufacturing plants is provided at Level 3, where property taxpayers, municipalities and their respective representatives can review how the current values are calculated.

How to Best Use This Report

This report is best reviewed in association with the Methodology Guide for special purpose chemical manufacturing plants.

The Methodology Guide offers a comprehensive overview of the assessment procedures MPAC has carried out to arrive at estimates in current value for special purpose chemical manufacturing plants.

This MVR will share and discuss the data parameters and calculations that MPAC has used to determine the assessed values for all special purpose chemical manufacturing plants in Ontario.

Description of the Subject Properties

There are five broad categories the subject properties in this report fall within:

- organic chemical manufacturing
- inorganic chemical manufacturing
- synthetic fibre manufacturing
- other petroleum and coal product manufacturing
- petrochemical manufacturing

Organic Chemical Manufacturing

"Operators in this industry manufacture basic organic chemicals (excluding petrochemicals), industrial gases and synthetic dyes and pigments. Key product groups include gum and wood products, cyclic crudes and intermediates, and ethyl alcohol, along with other basic organic chemicals. These products are predominantly intermediates that are used as raw material inputs by other manufacturing industries in the production of downstream products."[3]

The primary activities of this industry are:

- manufacturing ethyl alcohol
- manufacturing methanol
- manufacturing wood and gum chemicals
- manufacturing fatty acids
- manufacturing cyclic crudes and other chemical intermediates
- manufacturing all other organic chemical products[4]

Inorganic Chemical Manufacturing

"This industry manufactures a variety of basic inorganic chemicals, most of which are mineral- based, as opposed to carbon-based organic chemicals. Inorganic chemicals are used as inputs in a number of manufacturing and industrial processes. Key identifiable industry segments include chlor-alkali and carbon black products. The industry does not manufacture industrial bleaches (see IBISWorld

[3] IBISWorld, "Organic Chemical Manufacturing in Canada: Market Research Report," NAICS 32519CA (Sept 2015).
[4] Ibid

report 32561CA) or chlorine preparations for swimming pools (IBISWorld report 32599CA)."[5]

The primary activities of this industry are:

- manufacturing alkalies and chlorine
- manufacturing chemical catalysts
- manufacturing inorganic acids
- manufacturing carbon black and all other basic inorganic chemicals[6]

Synthetic Fibre Manufacturing

"This industry produces cellulosic and noncellulosic fibers and filaments in the form of monofilament, filament yarn, staple or tow. Key cellulosic organic fibers and filaments include rayon and acetate. Noncellulosic fibers and filaments include acrylic, nylon, polyester and spandex. This industry does not include fiber, yarn or thread mills, thread manufacturers of any other fibers, or manufacturers of hemp yarn."[7]

The primary activities of this industry are:

- manufacturing cellulosic and noncellulosic fibres and filaments
- manufacturing polyester fibres and filaments
- manufacturing polyolefin fibres and filaments
- manufacturing acetate fibres and filaments
- manufacturing rayon fibres and filaments
- manufacturing nylon and other polyamide fibres and filaments[8]

Other Petroleum and Coal Product Manufacturing

"This Canadian industry comprises establishments, not classified to any other Canadian industry, primarily engaged in manufacturing petroleum and coal products. Establishments primarily engaged in re-refining used products are included."[9] This category excludes petroleum

[5] IBISWorld, "Inorganic Chemical Manufacturing in Canada: Market Research Report," NAICS 32518CA (Jun 2015).
[6] IBISWorld, "Inorganic Chemical Manufacturing in Canada: Market Research Report," NAICS 32518CA (Jun 2015).
[7] IBISWorld, "Synthetic Fibre Manufacturing in Canada: Market Research Report," NAICS 32522CA (Mar 2015).
[8] Ibid
[9] Statistics Canada North American Industry Classification System (NAICS) Canada 2012, 324190.

refineries and ethanol plants.

Typical activities of this industry are:

- coke oven products (e.g., coke, gases, tars), made in coke oven establishments
- coke ovens
- fireplace logs, made from refined petroleum or coal
- lubricating, cutting, grinding or penetrating oils and greases, made from refined petroleum
- motor oil, hydraulic brake fluids and transmission fluids made from refined petroleum
- recycling (i.e., re-refining) used motor and lubricating oils
- waxes, petroleum, made from refined petroleum[10]

Petrochemical Manufacturing

"This Canadian industry comprises establishments primarily engaged in converting feedstocks derived from petroleum, or from petroleum and natural gas liquids, into petrochemicals. Some important processes used in petrochemical manufacturing include steam cracking and steam reforming. For the purpose of defining this industry, petrochemicals consist of acyclic (aliphatic) hydrocarbons and cyclic aromatic hydrocarbons."[11]

Typical activities of this industry are:

- acyclic hydrocarbons (except acetylene), made from refined petroleum or natural gas liquids
- aromatic cyclic hydrocarbons, made from refined petroleum or natural gas liquids
- benzene, made from refined petroleum or natural gas liquids
- butane, made from refined petroleum or natural gas liquids
- ethane, made from refined petroleum or natural gas liquids

[10] Statistics Canada North American Industry Classification System (NAICS) Canada 2012, 324190.
[11] Statistics Canada North American Industry Classification System (NAICS) Canada 2012, 325110.

- ethylene (ethene), made from refined petroleum or natural gas liquids
- hexane, made from refined petroleum or natural gas liquids
- paraffins (alkanes), made from refined petroleum or natural gas liquids
- pentane, made from refined petroleum or natural gas liquids
- styrene, made from refined petroleum or natural gas liquids
- toluene, made from refined petroleum or natural gas liquids
- xylene, made from refined petroleum or natural gas liquids[12]

See Schedule A for a list of miscellaneous chemical manufacturing plants in Ontario.

[12] ibid

Responsibility of MPAC

Role of the Assessor

MPAC has a statutory responsibility to estimate the current value of the fee simple interest in the land as of January 1, 2016. The assessed values will be relied upon to allocate property taxes for the 2017 to 2020 taxation years.

More simply, MPAC has an obligation to estimate what a property would realize if it were to sell on January 1, 2016.

The definition of current value is commonly accepted to represent the concept of value in exchange.

With this in mind, it is important to determine how the subject properties would be exchanged. There are three scenarios involving the subject properties that would be considered by the participants involved in the exchange:

- continued use of the improvements
- alternate use of the improvements
- raze the improvements and redevelop the land

This reality is the rationale for determining the highest and best use of the land while undertaking an appraisal of the subject properties.

The processes involved with manufacturing chemicals are highly specialized, and the real property is highly integrated with the dedicated manufacturing equipment; in fact, the subject's design, sheer size and configuration to accommodate this special purpose causes it to not be feasible to adapt much of the plant to another purpose.

As stated above, each subject property's design prevents alternate uses from being practical. This leaves two potential scenarios under which a subject property would exchange: continued use or razing all or a portion of the improvements to accommodate redevelopment.

Analysis contained in this report is based upon the assumption that the current use is highest and best; therefore, the value in exchange of the subject contemplates a willing seller and buyer who each make value judgments based upon the utility derived by the subject property to manufacture chemicals.

Appraisal Theory

Highest and Best Use

The highest and best use of a property may be defined as "the reasonably probable and legal use of vacant land or improved property that is physically possible, appropriately supported, financially feasible, and that results in the highest value."[13]

This economic concept measures the interaction of four criteria: legal permissibility, physical possibility, financial feasibility and maximum profitability. Estimating the highest and best use of a property is the most critical component of an appraisal as it sets the valuation context for the selection of comparable properties and analysis undertaken in the report.

Physical Possible Uses

This refers to the legal, physically possible uses of the subject that can be accomplished on the site considering the size, shape, topography, soils and environmental conditions.

Legal Permissible Uses

This refers to the possible uses of the subject permitted legally by land use controls, any existing leases, easements, deed restrictions or subdivision controls, covenants and restrictions or any other public or private limitations.

Financially Feasible Uses

This refers to the legal, physically possible uses of the subject that will produce a positive net financial or economic return to the owner of the site.

Maximally Productive Use

This refers to the use that satisfies the three criterions listed above and that produces the highest value.

Summary

The highest and best uses of the subject properties are assumed to be the current uses of each property. Each of the properties was in operation as of the date of the report; therefore, it is assumed that each of the four criterions has been satisfied.

Due to the design of the subject properties, there is likely only one use that is financially feasible.

[13] *The Appraisal of Real Estate, Third Canadian Edition* (Appraisal Institute of Canada, UBC Commerce, Real Estate Division, 2010), 12.1.

How to Derive Current Value

There are traditionally three approaches to value estimation employed by an assessor: the cost approach, the direct comparison approach and the income approach. There may not always be sufficient data for development of all value methods and varying degrees of reliability may be achieved based on the quality and quantity of data gathered for each approach. The process of value correlation seeks to determine the most representative estimate of value for the subject property based on the strengths and weaknesses of each approach. For complete descriptions of each of the three approaches, please refer to *The Appraisal of Real Estate*.

How to Derive Current Values for the Subject Properties

As previously stated in this report, there may not always be sufficient data for development of all valuation methods. For most property types, there is an active market of sales and leases that are instructive to an assessor estimating current value; however, that is not the case for the subject properties.

A dearth of sales precludes the use of the direct comparison approach, and a lack of lease agreements prevents the use of the income approach; therefore, the assessor is left with only the cost approach to derive current value.

A more detailed explanation for sole reliance upon the cost approach follows.

Why the Direct Comparison Approach Was Not Developed

In the direct comparison approach, properties similar to the subject that have been sold recently or for which listing prices or offers are known are compared to the subject.

Comparable properties "should have the same or similar highest and best use as the improved subject property."[14]

It is important to note that when special purpose manufacturing plants transact they are often repurposed or razed, resulting in a change in use.

A change-in-use sale involves the sale of a property where the designed and intended use was no longer viable. As a result, production had ceased and the plant sits idle. A large plant is expensive to maintain after production has ceased, and it becomes a liability as opposed to a profitable asset; this greatly motivates a vendor to part with its property. The desire to sell such a property is usually met with tepid demand; the large floor area is frequently much greater than the subsequent user requires, and the capital and operating costs associated with such a

[14] *The Appraisal of Real Estate*, 7.11.

plant is often prohibitive to a purchaser.

The opposing motivations of most market participants to a change-in-use sale are the source of a volatile market. As a result, if the use of the plant changes after its sale, it can no longer be used for comparison to the properties that are the subject of this report.

Research did not uncover verified sales of similar facilities from which to draw any conclusions based on direct comparison.

Why the Income Approach Was Not Developed

The income approach to value is based, in large part, on the appraisal principle of anticipation, which assumes a definite relationship between a property's value and the income it produces. The process of the income approach discounts the present worth of the future income benefits the property will produce during the remainder of its economic life or during a projected term of ownership.

Properties similar to the subject properties seldom, if ever, trade as an asset that generates a rental income. An investor is unlikely to accept the risk associated with securing and retaining a tenant to occupy a plant designed to accommodate a sole use; special purpose manufacturing plants are invariably owner-occupied.

Research did not uncover any rental information involving properties similar to the subject properties.

Why the Cost Approach Was Developed

Special purpose business properties, such as chemical manufacturing plants, are amongst the most challenging types of properties to derive current values for.

In the fourth quarter of 2014, MPAC engaged with an independent third party, the International Property Tax Institute (IPTI), to carry out recommended iterative discussions with taxpayers, municipalities and key experts to develop the guidelines for assessment methodologies.

Following the discussions, MPAC composed an assessment methodology guide, *Assessing Chemical Manufacturing Plants in Ontario.*

This guide states that "the valuation approach to be used for the valuation of special purpose manufacturing plants such as chemical plants is the cost approach."

MPAC's conclusion is consistent with guidance from *The Appraisal of Real Estate*, an

authoritative text used by the assessment industry.

Although the valuation approach may be agreed upon, there are key steps within the cost approach that require the assessor to demonstrate careful consideration.

Assessing Chemical Manufacturing Plants in Ontario was designed to assist the assessor in navigating through the process and producing an accurate estimate of current value of chemical manufacturing plants, utilizing the recognized and approved cost approach methodology.

The purpose of this report is to exhibit the data relied upon and the conclusions reached by the assessor as he/she navigated through the process to produce accurate estimates of current value for chemical manufacturing plants throughout Ontario.

How the Subject Properties Are Assessed

How MPAC Derives the Current Value of the Subject Properties

The guide *Assessing Chemical Manufacturing Plants in Ontario* recommends a valuation process comprising six steps:

1. Determine the property's functionality and utility (i.e., what it can do).
2. Establish the costs to construct the improvements as new.
3. Identify all forms of depreciation.
4. Quantify the depreciation identified.
5. Add the market value of the land to the depreciated value of the improvements.
6. Validate the result of the above process.

Step 1 – Determine the functionality and utility of the property for comparison to a modern plant

The first step requires the assistance of the owner of the subject property to determine the property's functionality and utility (what it can do and the expected benefits to be derived).

As a result of concluding that the subject property is special purpose and that the current use is highest and best, the first step in the process is very straightforward – the property's function is to manufacture chemicals. However, the assessor requires the assistance of the owner of the subject property to evaluate its functionality and utility. Evaluating the functionality and utility of a chemical manufacturing plant requires a broad understanding of the processes occurring within the plant – with few exceptions, this is beyond the scope of an assessor.

The assessor should ask one preliminary question and follow the answer with a series of subsequent questions that begin with "Why." The assessor may ask as many subsequent questions as required in order to understand.

The assessor should encourage the owner to compare the existing plant against an ideal or contemporary plant that could perform the same function when considering his/her answers.

This preliminary discussion with the owner will afford the assessor a thorough understanding of the manufacturing of chemicals and will help to frame many of the mathematical adjustments that are made later in the valuation process.

Throughout the iterative consultations and during related inspections, the owner of the subject property is encouraged to offer as much insight as possible.

Step 2 – Establish the costs to construct the improvements as new

This step is largely the result of data collection and data entry. Establish the value of the subject property by using MPAC's Automated Cost System (ACS) to determine reproduction cost as new.

The data required to estimate the reproduction cost new is collected by the assessor during site inspection and is often validated by viewing building plans.

The primary data collected is:

- gross floor area of the building(s)
- height of the building(s)
- type of building materials
- quality of building materials

The data is manually entered into ACS, MPAC's proprietary software. It is a component-based cost system where major building components are valued in place, which includes all costs associated with building and installing a particular component. Components include foundations, floor structure, frame and span, exterior base walls and additives, roof finishes, partitions, interior finishes, built-ins, electrical, plumbing, heating, ventilation and air conditioning and fire protection.

Component costs, including labour, material and equipment costs, have been normalized. Material costs are considered on the basis of current (base year dates) market costs. Labour costs are based upon typical union labour rates, including benefits.

The practice listed above is consistent with how an MPAC assessor would derive the reproduction cost new for any type of building. Due to the specialized nature of a chemical manufacturing plant and due to recent litigation before the Assessment Review Board involving the estimation of reproduction cost new of a special purpose manufacturing plant, MPAC has opted to have a third party provide additional data to verify the costs estimated by assessors using ACS.

The additional data was provided by Hanscomb Limited, founded in 1957 and one of the largest cost consulting companies in Canada.

The reproduction cost new of the miscellaneous chemical manufacturing sector ranges from $66 to $115, with a median of $88.

It is important to note that the assessor is careful to exclude any of the reproduction costs associated with buildings at a mining operation that are under land. Section 3(1)20 of the *Assessment Act* provides that "the buildings, plant and machinery under mineral land and the machinery in or on the land only to the extent and in the proportion that the buildings, plant and machinery are used for obtaining minerals from the ground and all minerals that are in, on or under land" are exempt from taxation.

Furthermore, it is important to note that any tailings ponds, dams, etc. used in connection with a mining operation are not reflected in the reproduction cost new as it is MPAC's view that they do not improve the land.

Step 3 – Identify all forms of depreciation

This is the step in the valuation process where the assessor must demonstrate sound judgment and analysis by applying a breakdown approach to depreciation whereby each separate element of depreciation is identified and applied as follows. The assessor may find he or she is required to revise the reproduction cost new to reflect the cost to replace the improvements.

There is a key distinction between reproduction cost new and replacement cost new.

Reproduction cost new is the cost to construct an exact replica as of January 1, 2016, whereas replacement cost new is the cost to construct a modern facility that offers the same utility as the original improvements.

This is a key step in the application of the cost approach because the assessor must discern if the existing plant would have been replaced by a similar plant as of January 1, 2016, or if the replacement plant (often referred to as a model) would have been substantially different.

The determination of the reproduction cost new is largely a factual undertaking, whereas the exercise involving the derivation of replacement cost new may involve some professional judgment – although the existing plant is a tangible entity, the replacement plant may be based upon a hypothetical construct.

The differences, if any, between the cost to construct the existing plant and the cost to construct its replacement must be reflected in the cost approach. The difference is referred to as the Functional Obsolescence resulting from Excess Capital Costs.

It is important to note that the existing plant reflects the prevailing market conditions when the

plant was constructed. A brief overview of the steps involved in designing and constructing a manufacturing plant is as follows:

1. Estimate effective market demand for the product to be manufactured.
2. Forecast how much of the market share the company will achieve.
3. Design a manufacturing process that will enable the company to fulfill their share of the market.
4. Design and construct a plant to house the manufacturing process.

The greater the period of time that passes from the date of construction to January 1, 2016, the more likely it is that some of the aforementioned conditions will have changed. Any changes in conditions may result in a replacement plant that differs from the existing plant.

Although it is very possible that every plant owner, with the benefit of hindsight, would replace their plant differently, the most substantial differences would occur when the plants are older – the question is, how much older?

Not surprisingly, there is no definitive answer to this question; however, there have been two significant changes in recent history impacting manufacturing companies located in North America:

- the North American Free Trade Agreement (NAFTA)
- the rise of globalization

NAFTA came into effect in 1994, and globalization can be traced back to the late 1980s and early 1990s.

In addition to the geopolitical influences of NAFTA and globalization, there are other changes that must be considered by the assessor:

- changes in consumer tastes
- changes in manufacturing processes
- changes in building design

There is no definitive answer to the question “how much older?”; however, due to the significant geopolitical events and the potential for additional changes that may have occurred since a plant was constructed, MPAC will give more attention to the plants that are 25 years old

or greater.

It is beyond the area of an assessor's expertise to opine on how a special purpose manufacturing plant would have been constructed on January 1, 2016, to reflect the present market conditions. With this in mind, MPAC intended to focus the iterative discussions on plants constructed in 1991 (i.e., 2016 – 25 years) or prior.

Notwithstanding various requests made to plant owners, MPAC did not engage in many iterative discussions that were focused on the determination of how the replacement plant would differ, if at all, from the existing plant. It is beyond the scope of this report to explain the reasons that MPAC's requests went largely unanswered.

In the absence of shared insight, MPAC had reference to the work files associated with each of the plants to gauge how any excess capital costs were accounted for in prior assessments.

Historically, MPAC would have reflected functional obsolescence resulting from excess capital costs and from excess operating costs as a single adjustment. In most instances the allotment for excess operating costs would have been 5 per cent; therefore, if a historical adjustment exceeded 5 per cent, the remainder could be attributed to excess capital costs (e.g., if total functional obsolescence was 13 per cent the loss resulting from excess capital costs was 8 per cent).

In many instances the assessor has carried forward the historical adjustment from the previous reassessment [i.e., 2012 Current Value Assessment (CVA)] to account for excess capital costs during this reassessment.

The following data provides an overview of the allotments made to account for excess capital costs realized by the 84 properties in the broader chemical sector:

Allotment	**Instances**
0	6
1 to 10	2
11 to 20	7
21 to 30	2
31 to 40	5
41 to 50	1

51 to 60	1
61 to 70	2
71 to 80	0
81 to 90	1
91 to 100	0
Total	27

The average allotment for the sector is 26 per cent.

Step 4 – Quantify the depreciation identified

This step in the valuation process is the result of subtracting total depreciation from the reproduction cost new to arrive at the current value of the buildings and other site improvements. The total depreciation includes physical deterioration, functional obsolescence and external obsolescence.

Step 4a – Apply physical deterioration

This step in the valuation process is to account for normal and abnormal wear and tear. Apply physical deterioration due to age from the typical depreciation tables found in the cost manual and make adjustments as required to age-related depreciation due to the actual state and condition of the property.

Within ACS there are life tables that calculate the loss in value resulting from the normal wear and tear that buildings and structures suffer from over their estimated useful life. It is important to note that there is a difference between an improvement's useful and economic life. The economic life of a structure is the period over which the improvements contribute to property value, and the useful life is the period over which the improvement is expected to function according to its design.

The useful life is used to estimate physical deterioration.

The life tables within ACS do not assign different rates of physical deterioration to long-lived and short-lived items. Instead, the varying useful lifespans of the items are blended and the overall useful life estimation is applied to the entire building or structure.

See Schedule B for an example of the 50-year useful life table.

In addition to the useful life determination, MPAC's estimate of physical deterioration is affected by the effective age of the improvements. It is important to note that there is a difference between actual age and effective age. The actual age refers to the time that has passed since the building was completed. The effective age refers to the building's condition and is based on the assessor's judgment and interpretation of the market.

The effective age of a structure is impacted by the level of maintenance that it has received. If a structure has been well maintained, the effective age may be less than the actual age; conversely, if a structure has been poorly maintained, the effective age may be greater. If a structure has received typical maintenance, its effective and actual age may be the same.

An example of the methodology for physical deterioration follows:

Line	Parameter	Formula	Details
1	Cost New		$1,350,000
2	Year Built		1993
3	Level of Maintenance		Typical
4	Effective Year of Valuation		2016
5	Actual Age	Line 4 – Line 2	23 years
6	Effective Age		23 years
7	Estimated Useful Life		50 years
8	Remaining Useful Life	Line 7 – Line 6	27 years
9	MPAC Life Table		OR 50
10	Per cent Good Allotment		54%
11	Estimated Physical Deterioration (%)	100% – Line 10	46%

12	Estimated Physical Deterioration ($)	Line 1 * Line 11	$621,000

Step 4b – Apply functional obsolescence

This is the step in the valuation process that accounts for any functional obsolescence not already captured by comparing the reproduction cost new to the replacement cost new.

The assessor must estimate the loss in value resulting from inefficiencies or inadequacies that impair the utility and/or cause the owner to incur excess operating costs. The most common example of this is for piecemeal construction that creates a disjointed manufacturing process and results in the owner incurring excess operating costs.

The assessor can account for the loss in value by way of a quantitative or qualitative adjustment.

A quantitative adjustment to account for a loss in value resulting from excess operating costs is derived by summing the annual excess operating costs and selecting the appropriate discount rate and term to determine the present value of the loss in value caused by the deficiency.

The quantitative adjustment proved to be difficult to account for. In order to determine excess costs, the assessor must be aware of normal costs. Normal operating costs are not within an assessor's area of expertise and would need to be provided by the owner of the building – most owners are either disinclined to provide such information or find it challenging to discern and display normal operating costs. As a result, this method was not broadly applied in the assessments of the subject properties.

The absence of the data required a quantitative adjustment, and the assessor relied on a qualitative adjustment to account for the loss in value. A qualitative adjustment is not inconsistent with what had been completed in previous reassessments (i.e., 2012 CVA); however, the adjustments are now greater in many circumstances. The adjustment was formerly applied as an allotment of 5% regardless of the age of the plant. MPAC consulted with property owners who stated that 5% was often too low and the assessor also made reference to recent ARB decisions where the tribunal found that amounts greater than 5% may be appropriate in certain circumstances. Throughout the consultations and after having reference to the decisions the assessor noted a positive relationship between age and deficiencies – the greater the age the greater the presence of deficiencies. To account for this reality the assessor developed a more dynamic approach to accounting for the loss in value.

The qualitative adjustment made to estimate a loss in value resulting from inefficiencies or

inadequacies that impair the utility and/or cause the owner to incur excess operating costs range from 0–15% of the replacement cost new. The following table illustrates the allotments made:

Actual Age of Plant	Allotment for Excess Operating Costs	Actual Age of Plant	Allotment for Excess Operating Costs
1	0%	16	8%
2	1%	17	8%
3	1%	18	9%
4	2%	19	9%
5	2%	20	10%
6	3%	21	10%
7	3%	22	11%
8	4%	23	11%
9	4%	24	12%
10	5%	25	12%
11	5%	26	13%
12	6%	27	13%
13	6%	28	14%
14	7%	29	14%
15	7%	30	15%

The rationale for the sliding scale is that deficiencies become more prominent over the normal passage of time.

Step 4c – Apply external obsolescence

This step in the valuation process takes into consideration the external factors that influence current value by applying external obsolescence as required.

There are two subcategories that fall under the heading of external obsolescence:

- economic obsolescence
- locational obsolescence

"Economic obsolescence is defined as a form of depreciation, or an incurable loss in value, caused by unfavorable conditions external to the property, such as the local economy, economics of the industry, availability of financing, encroachment of objectionable enterprises, loss of material and labor sources, lack of efficient transportation, shifting of business centers, passage of new legislation, and changes in ordinances. EO also may be caused by a reduced demand for the product; overcapacity in the industry; dislocation of raw material supplies; increasing costs of raw materials, labor, utilities, or transportation, while the selling price remains fixed or increases at a much lower rate; foreign competition; legislation; and environmental considerations."[15]

Locational obsolescence is a loss in value resulting from a location that adversely impacts the utility or profitability of a property.

This step will focus on the estimation of economic obsolescence. Although the recommended valuation methodology is the cost approach, the assessor must still have regard for the market.

There are two markets to be analyzed when studying industrial real property:

- "The real estate market, in which industrial properties trade and space in those properties is leased and occupied."[16]
- "The market for the goods produced in industrial facilities."[17]

[15] Micheal J. Remsha and Kevin S. Reilly, "Economic Obsolescence: Real Life Stories," *American Appraisal* (2009): http://www.american-appraisal.com/AA-Files/Library/PDF/EconomicObsolescence-RealLifeS.pdf.
[16] *Appraising Industrial Properties* (Appraisal Institute, 2005), 51.
[17] *Appraising Industrial Properties*, 52.

As previously stated, the subject properties are not often traded on the open market – in fact, research did not uncover any real estate market data related to the subject properties to be analyzed.

In the absence of real estate market data, MPAC analyzed the market for the goods produced at the subject properties when estimating their current values. This analysis involved a review of financial ratios associated with publicly traded companies involved in the manufacture of chemicals.

The current financial ratios were contrasted against those realized in recent history to gauge the economic well-being of the companies, with the corollary being the state of the market for the goods produced (i.e., chemicals) at the subject properties.

The financial ratios relied upon as indicators of the state of the market for chemicals are:

- gross margin
- return on invested capital
- Inventory turnover
- fixed asset turnover

In addition to analyzing financial ratios, there was reference made to the macroeconomic factors that impact the economic viability of the sectors.

Based on the findings, the allotted range of economic obsolescence in the chemical manufacturing industry is between 0% and 4%.

Special purpose chemical manufacturing properties are allocated an economic obsolescence between 0% and 4%; to the extent that the property is used for other purposes, in addition to chemical manufacturing, the economic obsolescence will differ.

See Schedule C for the full economic obsolescence analysis of the chemical manufacturing industry.

The same valuation process is applicable to the buildings and to the other site improvements. The other site improvements include such items as asphalt paving, weigh scales, storage tanks and railway sidings.

Step 5 – Determine the value of the land

This step in the valuation process deals with the determination of the land as if vacant by estimating the current value of the land and adding it to the value of the improvements.

The land values are derived via the direct comparison approach. In short, recent arms' length sales of lands principally zoned for industrial uses are analyzed to determine how much vacant land traded for in the open market as of the effective date.

It is important to note that the assessor is careful to exclude the value of the mineral interests when determining the current value of the land used in connection with a mining property.

In addition to the mining reference noted in section 3(1)20 of the *Assessment Act*, the assessment and taxation of mining lands is dealt with in the *Mining Act*, where certain types of mineral interests are not subject to either municipal assessment or taxation. It is MPAC's practice to treat mining rights – the mineral interests obtained from the Crown – as exempt from assessment and taxation.

MPAC's land analysis will be published on mpac.ca in early 2017.

Step 6 – Validate the results

This step in the valuation process is introduced to validate the estimate of total depreciation. Verify the estimated current value of the improvements using one of the following approaches:

a. Compare the total depreciation allowance with other approaches, such as age-life or market extraction.

b. Verify the current value by reference to market sales of similar properties.

This is a step in the valuation process where the assessor should have reference to chemical plants that have reached the end of their economic lives or have been involved in sales transactions.

If there are a sufficient number of chemical manufacturing plant closures, an assessor can derive an estimate of economic life and measure depreciation via the age-life method. The age-life method relies upon the assessor's estimates of effective age and total economic life for the subject's improvements. The depreciation is calculated as a ratio of the effective age to the total economic life and then applied to the cost new of the improvements.

For example, if there were a sufficient number of plant closures where the ages at closure ranged from 38 to 42 years, the assessor would conclude an economic life of 40 years.

This would indicate an annual depreciation rate of 2.5% (100% / 40 = 2.5%) on a straight-line basis. To validate the total depreciation derived via the breakdown method, the assessor would compare the results of each method.

The market extraction method relies upon the availability of sales from which depreciation can be extracted. The sold properties must be similar in terms of age and utility to the subject, and preferably the sales are current and from the subject's market area. Reliance upon this method implies that the land value and cost new of the improvements can be accurately estimated.

As noted above, and elsewhere in this report, properties similar to the subject properties do not trade frequently on the real estate market.

The paucity of real estate transactions was anticipated and consistent with recent history for this special purpose manufacturing sector. This reality makes it very difficult for the assessor to validate the values by way of traditional methods. To account for this challenge, the assessor made best efforts to engage in iterative discussions with stakeholders to ensure that the parameters relied upon to derive the values accurately reflect the circumstances facing market participants on January 1, 2016. If the stakeholder engaged with the assessor and provided meaningful insight and/or market data, there is a much greater likelihood that the assessed value reflects the amount the property would have realized had it sold on January 1, 2016.

In the absence of real estate transactions, the assessor relied upon stakeholder participation to validate the results – not surprisingly, the greater the stakeholder participation, the greater the assessor's certainty of the accuracy of the values.

Client and Intended Users

The client and intended users of the report are the valuation personnel of the Municipal Property Assessment Corporation, the owners and occupants of the properties described herein and the municipal and provincial levels of government.

Intended Use of the Report

The intended use of the report is to describe the analysis and explain the steps taken to derive the 2016 current value assessments for the properties described herein. The report will not address the current values on specific properties; rather, it will provide an overview of the valuation process for chemical manufacturing plants in Ontario.

Purpose of the Report

The purpose of this report is to share and discuss the data parameters and calculations that MPAC relied upon to determine the assessed values for all **chemical manufacturing plants in Ontario**.

Real Property Interest Appraised

The legal interest being appraised in this report is the current value of the unencumbered fee simple estate. Fee simple is defined as "*absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the four powers of government: taxation, expropriation, police power, and escheat*."[18] The owner of a fee simple interest has the right to sell, occupy, lease, or mortgage the property.

Definition of Value

The assessment of land in Ontario is based on its current value. Current value is defined as "*the amount of money the fee simple, if unencumbered, would realize if sold at arm's length by a willing seller to a willing buyer*."[19]

Effective Date of Value

The effective date of valuation is January 1, 2016.

Date of the Report

[18] *The Appraisal of Real Estate*, 6.1.
[19] *Ontario Assessment Act*

The date of the report is November 1, 2016

Ordinary Assumptions

The values established in this report are based on the following ordinary assumptions:

- Reliability of data sources;
- Compliance with government regulations;
- Marketable title;
- No defects in the improvements;
- Bearing capacity of soil;
- No encroachments;
- No site contamination exists;
- Due diligence by intended users.

Ordinary Limiting Conditions

The values established in this report are based on the following ordinary limiting conditions:

- Denial of liability to non-intended users and for any non-intended use;
- Responsibility denied for legal factors;
- No environmental audit was undertaken;
- Report must not be used partially;
- Possession of report does not permit publication;
- Any cost estimates are not valid for insurance purposes;
- Value conclusion is in Canadian dollars;
- Denial of responsibility for any unauthorized alteration to a report;
- Validity requires original signature.

Extraordinary Assumptions

The current use of the properties complies with applicable zoning by-law regulations, and is considered to be a legal non-conforming use. Subject to rare exceptions, the mass appraisal of the subject properties is based upon the extraordinary assumption that the current uses of the properties are highest and best.

Extraordinary Limiting Conditions

An extraordinary limiting condition has not been invoked in this report.

Hypothetical Conditions

A hypothetical condition has not been invoked in this report.

Jurisdictional Exception

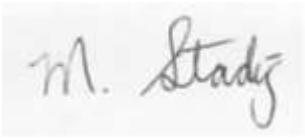
A jurisdictional exception has not been invoked in this report.

Certification

I certify that, to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct;
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions and are the personal, impartial, and unbiased professional analyses, opinions and conclusions of MPAC;
- I have no present or prospective interest in the properties that are the subject of this report and no interest with respect to the parties involved;
- I have no bias with respect to the properties that are the subject of this report or to the parties involved with this assignment;
- My engagement in this assignment was not contingent upon developing or reporting predetermined results;
- The analysis, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Canadian Uniform Standards of Professional Appraisal Practice;
- I have not made personal inspections of all the subject properties that are the subject of

this report.



Malcolm Stadig, MRICS, CAE, ASA, MIMA

Manager, Advisory Services

Schedule A: Special Purpose Miscellaneous Chemical Manufacturing Plants in Ontario

Roll Number	Address	City
070600003500700	1400 County Rd 2	Augusta Tp
080201003045101	250 Laurier Blvd	Brockville C
101108001001800	455 Front Rd	Kingston C
210502002402400	385 Southdown Rd	Mississauga C
210506013105900	2489 N Sheridan Way	Mississauga C
271103003709100	1555 Elm St	Port Colborne C
272511000201400	9061 Garner Rd	Niagara Falls C
380522007007000	339 La Salle Line	St. Clair Tp
382940004940000	Vidal St S	Sarnia C
382940005000800	933 Vidal St S	Sarnia C
382940005031700	800 Tashmoo Ave	Sarnia C

Schedule B: 50-Year Useful Life Table

50-Year Average Life		
Year Built	**Effective Age**	**ACS % Good**
2017		100
2016	1	99
2015	2	98
2014	3	98
2013	4	97
2012	5	96
2011	6	95
2010	7	94
2009	8	94
2008	9	92
2007	10	91
2006	11	89
2005	12	87
2004	13	86
2003	14	84
2002	15	83
2001	16	81
2000	17	80
1999	18	78
1998	19	75
1997	20	73

50-Year Average Life		
Year Built	**Effective Age**	**ACS % Good**
1996	21	71
1995	22	69
1994	23	66
1993	24	64
1992	25	62
1991	26	61
1990	27	61
1989	28	60
1988	29	59
1987	30	58
1986	31	58
1985	32	57
1984	33	56
1983	34	55
1982	35	54
1981	36	52
1980	37	51
1979	38	49
1978	39	48
1977	40	47
1976	41	45
1975	42	44

50-Year Average Life		
Year Built	**Effective Age**	**ACS % Good**
1974	43	42
1973	44	40
1972	45	38
1971	46	36
1970	47	33
1969	48	31
1968	48	29
1967	50	27
1966	51	27
1965	52	26
1964	53	25
1963	54	25
1962	55	24
1961	56	24
1960	57	23
1959	58	23
1958	59	21
1957	60	20
1956	61	20