



MUNICIPAL
PROPERTY
ASSESSMENT
CORPORATION



ASSESSMENT METHODOLOGY GUIDE

ASSESSING PULP AND PAPER MILLS IN ONTARIO

2016 BASE YEAR

JUNE 2015

This document describes the assessment methodology that MPAC currently expects to use for the 2016 Assessment Update for properties for which the current use is as a pulp and paper mill and for which the current use has been determined by MPAC to be the highest and best use. Assessors exercise judgment and discretion when assessing properties and may depart from MPAC's preferred assessment methodology when assessing a particular property, however, any deviation from these guidelines must be thoroughly documented.

This document has been prepared by MPAC to help assessed persons review how the current value of the property likely will be determined, illustrate the uniform application of valuation parameters to the property type and consider whether MPAC's subsequent assessed value is correct and equitable in comparison to the assessed value of similar real property so as to ensure the fair distribution of the property tax burden. The information in this document will help property owners to meet the requirements of subsection 39.1(4) of the Assessment Act and Rule 16 of the Assessment Review Board when providing reasons for making a Request for Reconsideration or filing an Appeal to the Assessment Review Board.



MUNICIPAL PROPERTY ASSESSMENT CORPORATION

April 30, 2015

In accordance with the direction issued by the Minister of Finance on April 18, 2015, pursuant to subsection 10(1) of the [Municipal Property Assessment Corporation Act](#), the Municipal Property Assessment Corporation (MPAC) has published Assessment Methodology Guides for the following industries:

- Pulp and Paper Mills;
- Saw Mills;
- Value-Added Wood Products Manufacturing Plants;
- Steel Manufacturing Plants;
- Automotive Assembly Plants;
- Automotive Parts Manufacturing Plants.

These Assessment Methodology Guides represent MPAC's preferred assessment methodologies in Ontario and are intended to provide clarity and transparency as to how property types in the above mentioned industries typically will be assessed.

A handwritten signature in black ink, appearing to read "A. Wisniowski", written over a horizontal line.

Antoni Wisniowski
President and Chief Administrative Officer

A handwritten signature in black ink, appearing to read "Larry Hummel", written over a horizontal line.

Larry Hummel, M.I.M.A, FRICS
Chief Assessor

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As part of the preparation of Assessment Methodology Guides, MPAC consulted with affected property taxpayers, municipalities, and representatives. MPAC engaged the International Property Tax Institute as an independent facilitator to undertake consultation sessions which included the following industries:

- Pulp & Paper Mills
- Saw Mills;
- Value-Added Wood Manufacturing Plants;
- Steel Manufacturing Plants;
- Automotive Assembly Plants;
- Automotive Parts Manufacturing Plants.

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City of Brampton	Canadian Vehicle Manufacturers' Association	Prestige Property Tax Specialists
City of St.Catharines	Ford Motor Company of Canada Limited	Municipal Tax Equity (MTE) Consultants Inc.
Corporation of the City of St. Thomas	Fiat Chrysler Automobiles	Cushman & Wakefield Property Tax Services
City of Guelph	Resolute Forest Products	Ryan
City of Oshawa	Domtar	Boreal Appraisal Services
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City of Cambridge		James Petrin Property Assessment Services
Town of Ingersoll		
Town of Milton		
Town of Oakville		
City of Greater Sudbury		
City of Thunder Bay		
Town of Espanola		
Township of Dubreuilville		
City of Thorold		
City of Mississauga		
Township of James/Elk Lake		

Questions about the consultation process can be directed to consultation@mpac.ca.

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Part 1 – Introduction

The Municipal Property Assessment Corporation (MPAC) – www.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 next province-wide Assessment Update will take place in 2016 when MPAC will update 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.

The accurate valuation of large special purpose industrial properties such as pulp and paper mills for property tax purposes presents a number of challenges due to the size and specialised 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 which, in turn, enables all stakeholders to understand the valuation process and have confidence in the fairness and consistency of its outcome.

This Methodology Guide 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.

It should be noted that "large" in the context of industrial properties means a property that falls within the definition of the "Large Industrial Property Class" contained in section 14 (1) of Ontario Regulation 282/98. In general, this refers to an industrial property in excess of 125,000 square feet in terms of "exterior measured area".

The following definitions may be helpful in reviewing this Methodology Guide:

Special Purpose Properties:

“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.”

[Appraisal Institute]

“Specialized property is 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.”

[International Valuation Standards Committee]

The characteristics of special purpose properties are likely to include:

- Unique improvements, design, layout, size, construction materials and/or building services that facilitate one or a limited number of uses.
- Generally contains 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.
- Limited market possibilities, except as a going concern business.
- Typically has 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., what is the nature, condition and financial health of the potential buyers and sellers.

1.1 Properties Covered by this Methodology Guide

This Methodology Guide relates to pulp and paper mills which include many different types of property with a variety of processes taking place within them. In broad terms, pulp and paper mills are engaged in manufacturing pulp, paper and paper products. The manufacture of pulp involves separating the cellulose fibres from other impurities in wood, used paper or other fibre sources. The manufacture of paper involves matting these fibres into a sheet. Converted paper products are produced from paper and other materials by various cutting and shaping techniques.

Product	Description
Market Pulp	Pulp that is sold in the open market, rather than converted to paper in a company's own mills. It can be produced from softwood or hardwood fibre and be bleached or unbleached
Newsprint	The thin paper used to print newspapers. It is made primarily with mechanical pulp and may include chemical pulp.
Kraft Paper	The heavy brown paper used for grocery bags, industrial sacks and wrapping papers.
Linerboard	The inner and outer seals of a corrugated box
Corrugating Medium	The brown wavy centre of the wall of a corrugated box.
Bleacher Paperboard	Used for folding cartons, milk cartons, disposable cups and plates
Tissue	Used in bathroom and facial tissues
Coated Paper	Coated with clays to produce a smooth surface, this paper is used for magazines and other uses that require colour printing
Uncoated Paper	Office papers, copying papers, tablets, envelopes, some printing papers

The list of properties within Ontario that are covered by this Methodology Guide change from time to time. A current list of the properties covered by this Methodology Guide can be found in Appendix A.

Brief Overview of the Industry and Process

The forest industry is important to the Canadian economy. It contributes up to 3% of the gross domestic product (GDP), and around \$35 billion in exports from Canada. Canada is the world's largest exporter of market pulp and newsprint and as a result, around 60,000 direct jobs (excluding wood products) and 250,000 indirect jobs have been created.

The wood fiber sources for pulp and paper mills are sawmill residue (55%), logs and chips (21%) and recycled paper (24%). There are two main pulping processes: mechanical and chemical. In the mechanical process, wood is pulped using the mechanical energy to press the fibers between narrow-gap plates (refiner mechanical pulping - RMP). This process may vary by adding steam (to warm the chips), pressure (thermomechanical pulping - TMP) and sometimes chemicals, or both (chemi-thermomechanical pulping - CTMP).

In the chemical process, wood chips and sawdust are cooked by using an aqueous solution of chemical. This process results in the separation of cellulose fiber from the wood by dissolving the lignin that binds the fibers together. The remaining solution (chemical and lignin) is then recycled to recuperate the chemicals. This is achieved by burning the chemical and lignin mixture (black liquor) to produce energy (recovery boiler) with the remaining residue treated in a caustic plant.

In both processes, the pulp could be washed or bleached depending on its final use. In most mills, the gas produced by the chemical process and washing are collected and burned. The power and recovery boilers generate the steam to meet all the requirements of the mill. The age, technology and emission controls of the boiler will determine the amount of air emissions generated by the mill.

Pulp Mill

A pulp mill is a manufacturing facility that converts wood chips or other plant fiber source into a thick fiber board which can be shipped to a paper mill for further processing. Pulp can be manufactured using mechanical, semi-chemical or fully chemical methods (kraft and sulfite processes). The finished product may be either bleached or non-bleached, depending on the customer requirements.

Wood and other plant materials used to make pulp contain three main components (apart from water): cellulose fibers (desired for papermaking), lignin (a three-dimensional polymer that binds the cellulose fibers together) and hemicelluloses, (shorter branched carbohydrate polymers). The aim of pulping is to break down the bulk structure of the fiber source, be it chips, stems or other plant parts, into the constituent fibers.

Chemical pulping achieves this by degrading the lignin and hemicellulose into small, water-soluble molecules which can be washed away from the cellulose fibers without depolymerizing the cellulose fibers (chemically depolymerizing the cellulose weakens the fibers). The various mechanical pulping methods, such as groundwood (GW) and refiner mechanical (RMP) pulping, physically tear the cellulose fibers one from another. Much of the lignin remains adhering to the fibers. Strength is impaired because the fibers may be cut. Related hybrid pulping methods use a combination of chemical and thermal treatment to begin an abbreviated chemical pulping process, followed immediately by a mechanical treatment to separate the fibers. These hybrid methods include thermomechanical pulping (TMP) and chemithermomechanical pulping (CTMP). The chemical and thermal treatments reduce the amount of energy subsequently required by the mechanical treatment, and also reduce the amount of strength loss suffered by the fibers.

Preparation of Fiber Source

The most common fiber source for pulp mills is pulpwood. Other common sources are bagasse and fiber crops. The first step in all mills using wood (trees) as the fiber source is to remove the bark. Bark contains relatively few usable fibers and darkens the pulp. The removed bark is burned, along with other unusable plant material, to generate steam to run the mill. Almost all wood is then chipped before being processed further in order to free the fibers.

Removal of the bark is done in a *barker* (or *debarker*). The bark adhesion is about 3–5 kg/cm² in the growing season (summer) and 2-3 times higher in the dormant season (winter). The bark of frozen logs is even more difficult to remove.

In chemical pulp mills, the bark introduces unwanted contaminants such as calcium, silica and aluminum that cause scaling and give an extra loading for the chemical recovery system. Birch bark contains betulin, a terpenoid that easily creates deposits in a pulp mill.

Mechanical Pulp Mills

The earliest mills used sandstone grinding rollers to break up small wood logs called "bolts", but the use of natural stone ended in the 1940s with the introduction of manufactured stones

with embedded silicon carbide or aluminum oxide. The pulp made by this process is known as "stone groundwood" pulp (SGW). If the wood is ground in a pressurized, sealed grinder the pulp is classified as "pressure groundwood" (PGW) pulp.

Most modern mills use chips rather than logs and ridged metal discs called refiner plates instead of grindstones. If the chips are just ground up with the plates, the pulp is called "refiner mechanical" pulp (RMP), if the chips are steamed while being refined the pulp is called "thermomechanical" pulp (TMP). Steam treatment significantly reduces the total energy needed to make the pulp and decreases the damage (cutting) to fibers. Mechanical pulp mills use large amounts of energy, mostly electricity to power motors which turn the grinders. A rough estimate of the electrical energy needed is 10,000 megajoules (MJ) per tonne of pulp (2,750 kWh per tonne)

Chemical Pulp Mills

Chemical pulping processes such as the kraft (or sulphate) process and the sulphite process remove much of the hemicelluloses and lignin. The kraft process does less damage to the cellulose fibers than the sulphite process, thereby producing stronger fibres, but the sulphite process makes pulp that is easier to bleach. The chemical pulping processes use a combination of high temperature and alkaline (kraft) or acidic (sulphite) chemicals to break the chemical bonds of the lignin.

The material fed into the digester must be small enough to allow the pulping liquor to penetrate the pieces completely. In the case of wood, the logs are chipped and the chips screened so that what is fed to the digester is a uniform size. The oversize chips are rechipped or used as fuel, sawdust is burned. The screened chips or cut plant material (bamboo, kenaf, etc.) goes to the digester where it is mixed an aqueous solution of the pulping chemicals, then heated with steam. In the kraft process the pulping chemicals are sodium hydroxide and sodium sulphide and the solution is known as white liquor. In the sulphite process the pulping chemical is a mixture of metal (sodium, magnesium, potassium or calcium) or ammonium sulphite or sulphite.

After several hours in the digester, the chips or cut plant material breaks down into a thick porridge-like consistency and is "blown" or squeezed from the outlet of the digester through an airlock. The sudden change in pressure results in a rapid expansion of the fibers, separating the fibers even more. The resulting fiber suspension in water solution is called "brown stock".

Brown stock washers, using countercurrent flow, remove the spent cooking chemicals and degraded lignin and hemicellulose. The extracted liquid, known as black liquor in the kraft process, and red or brown liquor in the sulphite processes, is concentrated, burned and the

sodium and sulphur compounds recycled in the recovery process. Lignosulphonates are a useful byproduct recovered from the spent liquor in the sulphite process. The clean pulp (stock) can be bleached in the bleach plant or left unbleached, depending on the end use. The stock is sprayed onto the pulp machine wire, water drains off, more water is removed by pressing the sheet of fibers, and the sheet is then dried. At this point the sheets of pulp are several millimeters thick and have a coarse surface: it is not yet paper. The dried pulp is cut, stacked, baled and shipped to another facility for whatever further process is needed.

Bleached kraft pulp and bleached sulphite pulp are used to make high quality, white printing paper. One of the most visible uses for unbleached kraft pulp is to make brown paper shopping bags and wrapping paper where strength is particularly important. A special grade of bleached sulphite pulp, known as dissolving pulp, is used to make cellulose derivatives such as methylcellulose which are used in a wide range of everyday products from laxatives to baked goods to wallpaper paste.

Chemi-mechanical Pulp Mills

Some mills pretreat wood chips or other plant material like straw with sodium carbonate, sodium hydroxide, sodium sulfite, and other chemical prior to refining with equipment similar to a mechanical mill. The conditions of the chemical treatment are much less vigorous (lower temperature, shorter time, less extreme pH) than in a chemical pulping process, since the goal is to make the fibers easier to refine, not to remove lignin as in a fully chemical process. Pulps made using these hybrid processes are known as chemithermomechanical pulps (CTMP). Sometimes a CTMP mill is located on the same site as a kraft mill so that the effluent from the CTMP mill can be treated in the kraft recovery process to regenerate the inorganic pulping chemicals.

Scheduling in Pulp Mills

The pulp process involves many production stages, usually coupled with intermediate storage tanks. As each stage has a different reliability and bottlenecks may vary from day to day, scheduling a pulp mill needs to take into account these bottlenecks and the probability of a disturbance or breakdown. Each stage also may have different decision variables, such as steam/water/chemical input, etc. Finally, scheduling needs to consider fuel optimization and CO₂ emissions, because part of the energy requirements may be met from fossil-fuel boilers. The overall aim is to maximize production at minimum cost.

Paper Mill

A paper mill is a factory devoted to making paper from vegetable fibres such as wood pulp using a Fourdrinier machine or other type of paper machine.

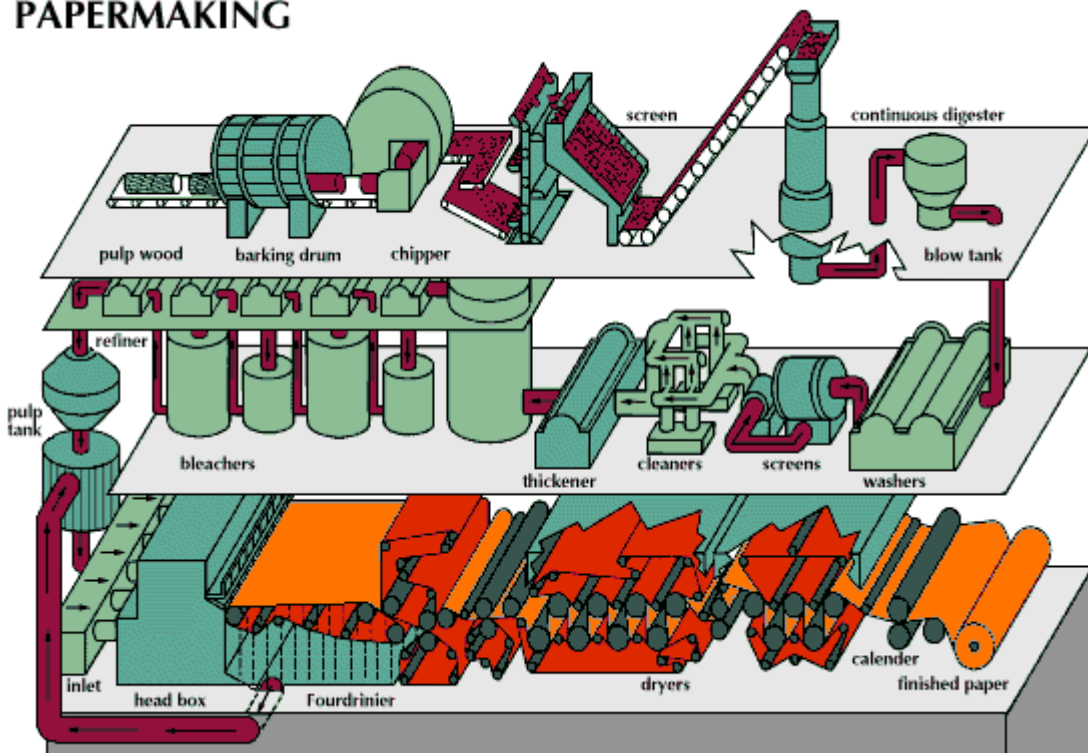
Paper mills can be fully integrated mills or non-integrated mills. Integrated mills consist of a pulp mill and a paper mill on the same site. Such mills receive logs or wood chips and produce paper.

The modern paper mill uses large amounts of energy, water, and wood pulp in a series of processes, and control technology to produce a sheet of paper that can be used in diverse ways. Modern paper machines can be 500 feet (~150 m) in length, produce a sheet 400 inches (~10 m) wide, and operate at speeds of more than 60 mph (100 km/h).

Diagram 1 gives an illustration of the process carried on at a combined pulp and paper mill.

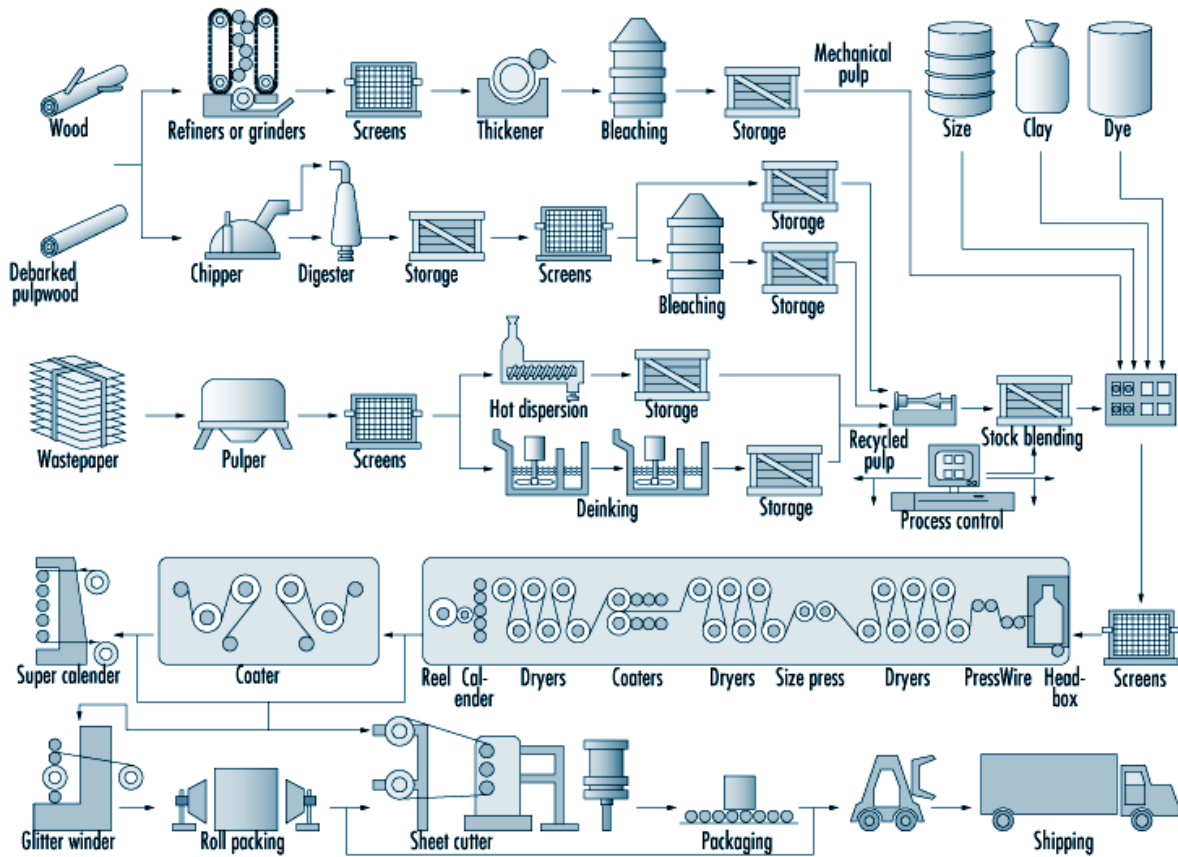
Diagram 1

PAPERMAKING



A slightly more detailed illustration is shown in Diagram 2; this diagram also provides more information about the many different types of machinery and equipment that may be found in a pulp and paper mill.

Diagram 2



Source: Adapted from Weidenmüller 1984.

Each pulp and paper mill is likely to operate a unique process and it is therefore important for the assessor to ask questions to ensure a full understanding of the process at a particular mill is obtained.

More information about the questions to ask is contained in Part 2 of this Methodology Guide.

Machinery and Equipment

Pulp and paper mills often contain large amounts of, often very specialized machinery and equipment such as debarkers, drums, chippers, grinders, bleachers, screens, digesters, blow tanks, thickeners, cleaners, washers, tanks, dryers, calenders, coaters, winders, cutters, etc.

1.2 Legislation

The main legislation governing the assessment of properties in Ontario for property tax purposes is contained in the *Assessment Act* 1990 (as amended).

The Act contains important definitions, including what property is taxable and how it should be valued.

The Act (section 1(1) Definitions) states that property must be assessed at its "current value" which means, in relation to land:

"... 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."

It should be noted that, in accordance with section 3(1) 17 of the Act, all items of machinery and equipment, and the foundations upon which they rest, used for manufacturing, though assessable, are exempt from taxation.

Other relevant legislation will be referred to as necessary in this Methodology Guide.

1.3 Valuations - General

Valuations of property are carried out for a variety of purposes. This Methodology Guide is provided specifically for assessors involved in the valuation of pulp and paper mills for property tax purposes in Ontario and other stakeholders who have an interest in the valuation.

The legislation governing the assessment of properties for property tax purposes in Ontario is set out above. It requires an assessment of the current value of all relevant properties as of a specific valuation date.

The valuation process follows a number of systematic steps intended to ensure that all relevant data is obtained and analysed before being used in the provision of an estimate of the market value of the property concerned as of the relevant date.

Many professional bodies provide guidance on how the valuation process should be undertaken and this Methodology Guide reflects the accepted guidance on the valuation of large special purpose properties such as pulp and paper mills.

In broad terms, the valuation process involves the following key steps:

- Ensuring a clear understanding of the purpose for which the valuation is being provided.
- Researching the legal framework concerning the valuation.
- Determining what needs to be valued.

- Identifying the date of the valuation.
- Analysing the relevant market (local, regional and/or international depending upon the type of property to be valued).
- Considering the highest and best use of the subject property (as explained later, it is assumed that the use of the property as a pulp and paper mill is the highest and best use of the property being valued for the purposes of this Methodology Guide).
- Obtaining pre-inspection data about the property to be valued.
- Carrying out a site inspection of the property to be valued.
- Taking appropriate measurements and recording details of other relevant information.
- Carrying out an inspection of any comparable properties that may be of assistance in ascertaining the value of the subject property.
- Determining the appropriate method, or methods, of valuation to be used.
- Carrying out the valuation.
- Reviewing the valuation.
- Finalizing and reporting the valuation.

In general, it is appropriate to consider the value of a property by three different perspectives or approaches to value:

- The direct (sales) comparison approach
- The income approach
- The cost approach

As suggested by the title, in the **direct (sales) comparison approach**, value is indicated by recent sales of comparable properties in the market. In the case of large special purpose industrial properties such as pulp and paper mills, there are generally very few, if any, sales or other market transactions which can be relied upon to provide an indication of market value; for this reason, the sales comparison approach is not used in the valuation of pulp and paper mills.

The sales comparison approach is applicable to all types of real property interests when there are sufficient recent, reliable transactions to indicate value patterns or trends in the market When data is available, this is the most straightforward and simple way to explain and support a value opinion When the market is weak and few market transactions are available, the applicability of the sales comparison approach may be limited. For example, the sales comparison approach is usually not applied to special-purpose properties because few similar properties may be sold in a given market, even one that is geographically broad. To value special-purpose properties, the cost approach may be more appropriate and reliable.

[The Appraisal of Real Estate, 12th edition, page 419]

In considering any sales evidence, it is critical to ensure that the property sold falls within the same use class as the property to be valued; in the case of special-purpose properties, the sale must relate to a property that has the same highest and best use as the subject property otherwise it is unlikely to be a reliable indicator of value.

However, if a sale of such a property does take place, it is important for the transaction to be analysed to see if it may provide useful information that may assist when reviewing a valuation prepared by the application of another approach.

In the **income approach** or, more accurately, the income capitalization approach, value is indicated by a property's revenue-earning power, based on the capitalization of income. This method requires a detailed analysis of both income and expenditure, both for the property being valued and other similar properties that may have been sold, in order to ascertain the anticipated revenue and expenses, along with the relevant capitalization rate. As already indicated, in the case of large special purpose industrial properties such as pulp and paper mills, there are unlikely to be any sales or rents of comparable properties from which relevant data can be obtained, so this approach is not used.

However, it may be necessary to consider both the income and expenses of pulp and paper mills when looking at depreciation within the cost approach; in particular, in considering the issue of obsolescence.

In the **cost approach**, value is estimated as the current cost of reproducing or replacing the improvements on the land (including buildings, structures and other taxable components), less any loss in value resulting from depreciation, and then adding the market value of the land.

The cost approach is the most appropriate method of valuing large special purpose industrial properties such as pulp and paper mills and will therefore be the subject of detailed guidance in the following parts of this Methodology Guide.

Using the cost approach also helps to exclude the value of the business being carried out within the property and is one of the reasons why this method of valuation is used for pulp and paper mills.

1.4 The Use of this Methodology Guide

This Methodology Guide is intended to:

- Ensure that pulp and paper mills are assessed at their correct current values.
- Ensure the assessments of pulp and paper mills are fair, accurate, predictable, and transparent.
- Provide direction to assessors to ensure that MPAC takes a consistent approach to valuing pulp and paper mills.
- Ensure that MPAC's methodology for valuing these properties is well documented and aligns with industry standards for market valuation in a mass appraisal environment.
- Explain MPAC's valuation methodology to municipalities, taxpayers, ARB Members and other stakeholders.
- MPAC assessors are expected to follow the procedures in the Guide. However, this Guide is not intended to be a substitute for an assessor's judgment in arriving at the current value for a particular property.

1.5 Consultation and Disclosure

MPAC is committed to providing municipalities, taxpayers and all its stakeholders with the best possible service through transparency, predictability and accuracy. In support of this commitment, MPAC has defined three levels of Disclosure as part of its delivery of the 2016 province-wide Assessment Update.

Three Levels of Disclosure (2016 Assessment Update)

Level 1 – Methodology Guides explaining how MPAC approached the valuation of particular types of property; in this case, pulp and paper mills.

Level 2 – Market Valuation Reports explaining how the methodology outlined in Level 1 has been applied at the sector level for the purposes of each assessment.

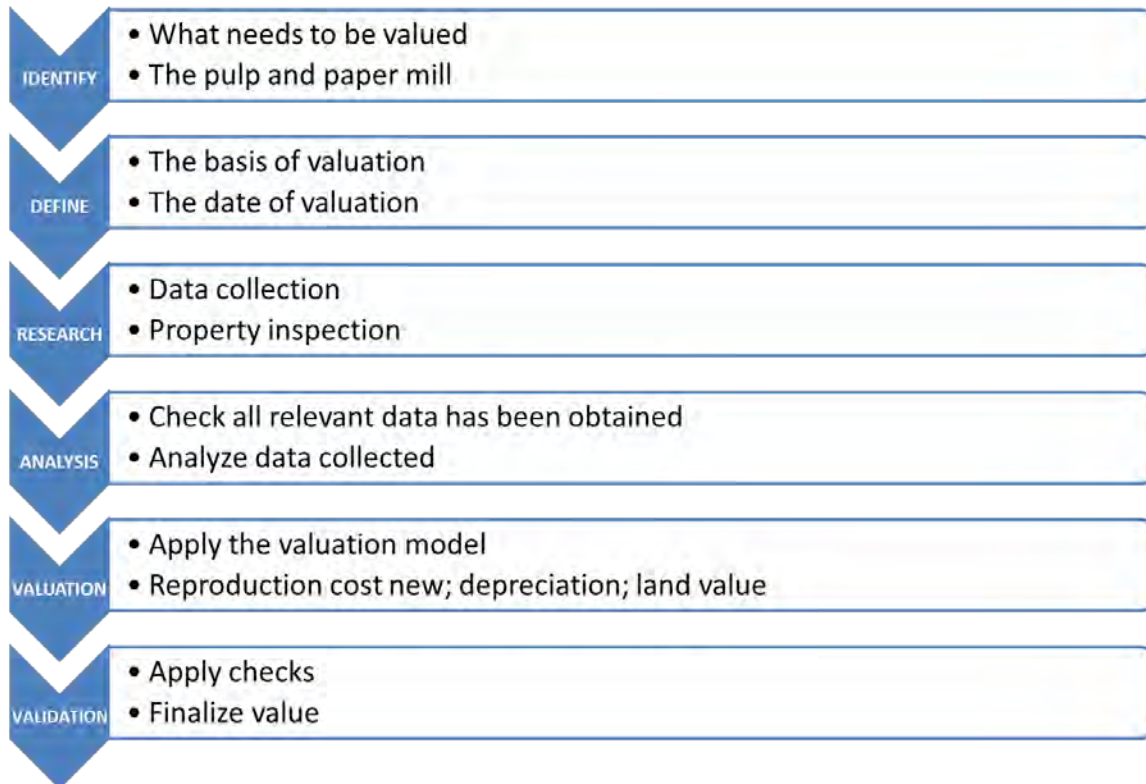
Level 3 – Property Specific Valuation Information, available to property taxpayers, their representatives and municipalities.

This Methodology Guide, and the consultation that preceded it, provides the main part of MPAC’s Level 1 Disclosure.

2 – The Valuation Process - Preparation

2.1 Six Main Steps

The assessor should follow the six main steps outlined in the chart below.



2.2 Identify What Needs to be Valued

The assessor needs to identify the extent of the property to be valued. The definition of land is all encompassing. Land includes not only the land itself (“terra firma”) but also buildings, structures, machinery and fixtures, or any part of such items.

2.3 Define the Basis of Value and Date of Valuation

The definition of value was identified previously and is the "current value" of the property which, in accordance with the Act, is:

"... 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."

This means that the assessor is concerned with the “market value” of the property and therefore needs to consider what data is required to enable an assessment of market value to

be prepared at the relevant valuation date. It should be noted that, for the purposes of this Methodology Guide, “market value” and “current value” have the same meaning.

The relevant legislated valuation date will differ for each four-year reassessment. The assessor should be clear about what valuation date is to be used for the particular reassessment.

In preparing a valuation, the assessor will need to take into account all relevant, value-significant evidence available that may assist in determining the value of the particular pulp and paper mill at the valuation date. The market conditions, i.e., the economic circumstances that underlie supply and demand, that give rise to value are likely to change between reassessments, so it is important to ensure that only those factors that are relevant at the specified valuation date are taken into account.

However, the assessor should have regard to the physical circumstances at roll return and value the land and improvements as they exist at that time assuming a sale on the valuation date, or at a later date if there have been changes to the property after the reassessment date.

2.4 Research – Data Collection

Data collection involves two main activities:

1. Collection of data relating to the pulp and paper mill to be valued.
2. Collection of market evidence or other data that will assist in the valuation.

Collection of Data Relating to the Pulp and Paper Mill to be Valued

The assessor should start by considering what information is available from current MPAC records concerning the property and then checking to ensure it is accurate and up to date.

The following types of data relating to the property to be valued need to be collected:

- If recent, purchase price/date, and/or construction costs, relating to the property.
- Layout plans, building plans, elevations, cross-sections, specifications, etc., relating to the property.
- A description of the process (or processes) undertaken at the property.
- Specific and detailed information concerning:

- the use of each part of the property
- the functionality (what it does and how well it does it) of the property
- the utility (i.e., the usefulness) of the property
- the productive capacity of the property
- recent/projected trends in production
- recent/projected trends in the cost of inputs
- recent/projected trends in the value of outputs
- recent/projected trends in profitability
- Any particular aspects of the pulp and paper mill that create inefficiencies.
- Any repairs or other remedial works that are required or planned.
- Any plans to change the existing pulp and paper operation.
- Any plans to alter, extend or demolish any parts of the property (and why).
- How the existing property compares with a modern equivalent facility (and the location and other details concerning a modern equivalent pulp and paper mill).
- Information with regard to the zoning of the property.
- Information about the locality in which the property is situated.
- Any other relevant information that may be available from other sources concerning the property (e.g., company accounts; the municipality; the Internet; etc.).
- Information available about competition from other pulp and paper mills.

Property Inspection

The assessor should take steps to collect the above information either in advance of a property inspection or during a property inspection. A property inspection will provide the following data:

- Confirmation of the data (size, layout, etc.) contained in plans, drawings, etc.

- Confirmation of the use of the various buildings, structures, etc.
- Details of the age/condition of the buildings, structures and other improvements.
- Confirmation of the information provided in respect of necessary repairs, etc.
- Details of any cost estimates provided in respect of necessary repairs, etc.
- Photographic record of the site, buildings, structures, other improvements, etc.
- Details of any other matters noted - positive or negative - with regard to the property.
- Commentary on the location of the property, transport links and access to the site

The above factors should be used as a check-list by the assessor to ensure that all relevant information is obtained prior to the valuation being undertaken.

How the information obtained may be used in the valuation is shown and discussed in Part 3 of this Methodology Guide.

Collection of Market Evidence or Other Data that will Assist in the Valuation

In the case of many types of property, market value can be derived from the evidence of sales or leases (rentals) of similar properties in the same locality as the property to be valued. However, in the case of large specialized properties such as pulp and paper mills, such market data is unlikely to be available in sufficient volume to provide a reliable indication of value.

Nevertheless, the assessor should seek whatever data may be available in terms of sales, leases, etc., of similar large industrial properties and consider whether or not such data may provide evidence that could assist in the valuation of a pulp and paper mill.

In addition to collecting data about the pulp and paper mill to be valued, and any market evidence that may exist, the assessor needs to carry out wider research that will assist in determining the value of the subject property. Such research is likely to include:

- The state of the pulp and paper industry. For example, the economic situation, supply and demand factors, etc., in Ontario, Canada, North America, and, possibly, worldwide.
- Trends in the pulp and paper industry. For example, whether it is growing, shrinking, or there have been any changes in manufacturing techniques; etc., in Ontario, Canada, North America, and, possibly, worldwide.

- Any evidence available to indicate the value of the properties used in the pulp and paper industry, e.g. sales, leases, construction costs, etc., in Ontario, Canada, North America, and, possibly, worldwide.

Much of the information required about the state of the industry, economic trends, etc., will be contained in the market valuation reports that form part of MPAC's Level 2 Disclosure. The assessor should ensure that the information contained in that report is properly reflected in the valuation to the extent that it has an impact on the value of the individual pulp and paper mill.

Confidentiality

As outlined above, it is important to be aware that, in order to enable MPAC to produce an accurate valuation of the property concerned, information needs to be obtained from a variety of sources.

This will include information from MPAC's records, from the owner or operator of the property, from the municipality in which the property is located, from the assessor's visit to the property, and from other sources.

All stakeholders in the property tax system have an interest in ensuring that the current value provided by MPAC is correct; in order to achieve this, it is necessary for all parties to cooperate in the provision of information.

It is appreciated that some of the information outlined above may be of a commercially sensitive nature. MPAC recognises the need to ensure that any information provided to them is properly safeguarded and only used for the purpose for which it is supplied. Assessors should appreciate the nature of this undertaking and ensure data is treated accordingly.

If after an appeal has been filed, MPAC receives a request for the release of actual income and expense information, or other sensitive commercial proprietary information, the usual practice is to require the person seeking the information to bring a motion before the Assessment Review Board, with notice to the third parties, requesting that the Assessment Review Board order production of the requested information. The release of such information is at the discretion of the Assessment Review Board.

Exception

S. 53 (2) This section does not prevent disclosure of that information,

(a) to the assessment corporation or any authorized employee of the corporation; or

(b) by any person being examined as a witness in an assessment appeal or in a proceeding in court involving an assessment matter. 1996, c. 4, s. 43; 1997, c. 43, Sched. G, s. 18 (34).

2.5 Analysis of Data Collected

Having carried out the data collection outlined previously, the assessor needs to analyse it and reach a conclusion regarding the appropriate valuation method to use and how it should be applied.

As already indicated, for the purposes of this Methodology Guide, it is assumed that the assessor will conclude that there is insufficient evidence available to enable either the direct comparison approach or income approach to be adopted. For that reason, the assessor will be adopting the cost approach and using the data collected to ensure that the cost approach is properly applied.

2.6 The Valuation

Having undertaken the necessary steps outlined above, the assessor should now be in a position to apply the appropriate valuation model. In the case of large pulp and paper mills, the assessor will be using the cost approach and detail on how that model should be applied is contained in Part 3 of this Methodology Guide.

2.7 Validating the Results

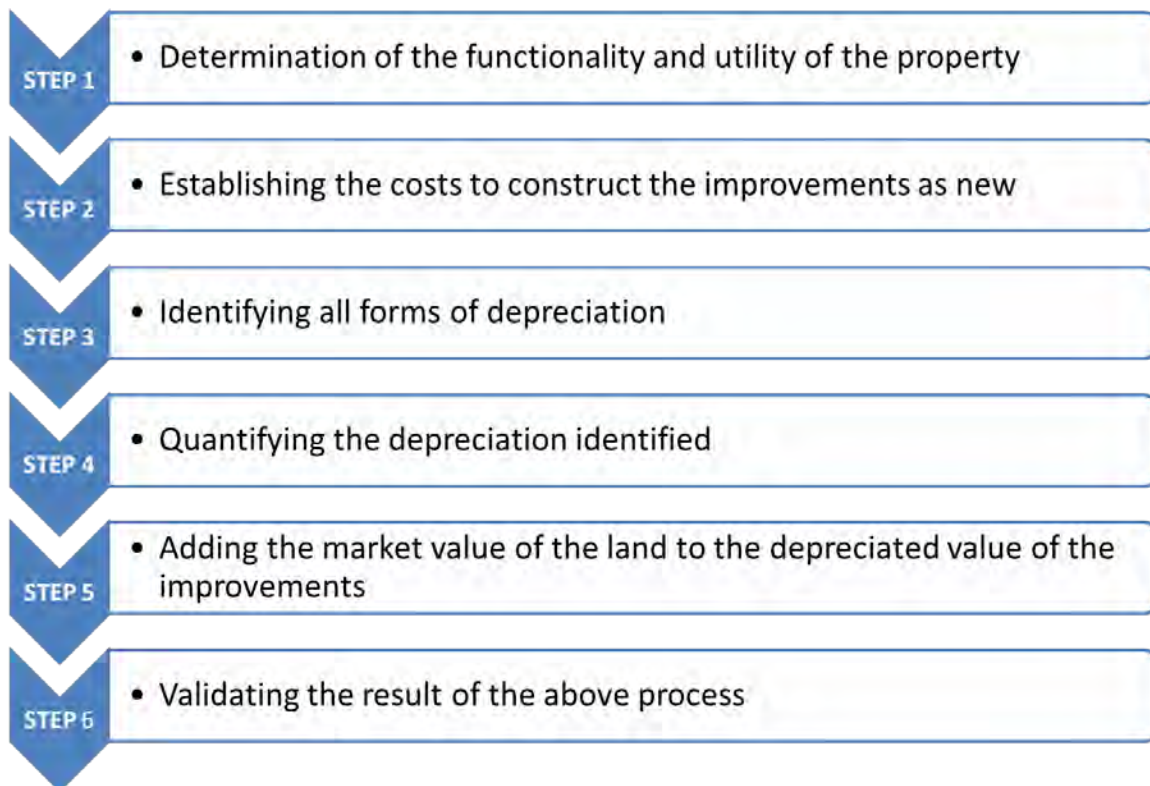
Once the assessor has completed the valuation, it is necessary to validate the results by carrying out a series of checks to ensure that all relevant parts of the property have been included in the valuation, that there has been no double-counting of any adjustments made for depreciation, that the resulting valuation has been compared with any market evidence that may be available in relation to pulp and paper mills or similar properties, and that the final valuation is in line with the valuation of other similar properties in Ontario.

Part 3 – The Valuation - Application

3.1 Summary of Cost Approach

As already indicated, the primary valuation approach to be used for the valuation of pulp and paper mills is the cost approach.

Using the cost approach derives a value by estimating the cost to replace the functionality and utility of a property. In broad terms, this requires six main steps:



This Methodology Guide is designed to assist the assessor to navigate through the valuation approach and produce an accurate estimate of current value of pulp and paper mills utilizing the recognized cost approach methodology.

3.2 Recommended Procedure

The Methodology Guide recommends a valuation process with the six main steps outlined above. More detail about each of those steps is set out below:

1. Property Evaluation

- Evaluate the property's functionality (what it can do).

- Evaluate the utility of the property (the expected benefits to be derived).

2. Determine Reproduction Cost New

- Establish the value of the subject property by using a cost manual (i.e., MPAC's Automated Cost System - ACS) to determine reproduction cost as new.

3. Identify Depreciation

- Evaluate the physical state and condition of the property.
- Consider how the functionality and utility of the subject property compares to a modern and efficient property.

4. Quantify Depreciation

- Apply a breakdown approach to depreciation whereby each separate element of depreciation is identified and applied, as follows:
 - Apply physical depreciation due to age from the typical depreciation tables found in the cost manual.
 - Make adjustments as required to age-related depreciation due to the actual state and condition of the property.
 - Apply functional obsolescence as required.
 - Apply external obsolescence as required.

5. Value the Land

- Estimate the market value of the land and add it to the value of the improvements.

6. Validate the Results

- Apply checks - age-life and market extraction (if market data available) - to ensure that there has been no double-counting of adjustments and the final valuation is consistent and accurate.

This Guide is designed to assist the assessor in the application of the cost approach to establish the current value assessment of food processing plants. It does not replace the

assessor’s judgment. The chart on the following page summarizes and outlines the six main steps in the valuation approach.

Outline of the Cost Approach Process



3.3 Definition of Terms

Each of the steps outlined in the chart above will be considered in detail in this Methodology Guide. Where appropriate, terms are defined as they are encountered in the text but, in addition, there is a Glossary of Terms in Appendix B.

3.4 Detailed Procedure

The following steps should be followed when valuing a pulp and paper mill. The assessor should always bear in mind that it is the actual property that is being valued, even though consideration may be given to how the actual property may be replaced by a different type of property (in terms of size, layout, etc.) when considering valuation issues such as functional obsolescence.

1. Property Evaluation

The first step in the process is to determine the type of property being valued and whether it falls within the property types, i.e., pulp and paper mills, covered in this Methodology Guide. Once satisfied that it does, the assessor needs to collect the information required to establish the current value of the property.

Part 2 of this Methodology Guide outlined the nature of the information to be collected prior to the valuation being carried out. The notes below add more detail about this process.

Review Assessment Records

Typically, there is some historical information on file in the assessment records, or available from assessment databases. The assessor will need to check this information carefully and ensure it is accurate and up to date.

In particular, the assessor should check MPAC's applications, i.e., the Integrated Property System (IPS) and the Source of Uniform Records for Cost Evaluation (SOURCE).

Information from the Municipality

The municipality should have provided MPAC with plans, etc., but the assessor needs to check to ensure they are the latest plans, drawings, etc. The drawings required include the following:

- plot plan(s)
- floor plan(s) - including horizontal measurements

- elevations - including vertical measurements
- cross-sections of the buildings

Ideally, these drawings, plans, etc., should be in electronic (e.g., CAD) format. The assessor should also check with the municipality to see whether it holds any other relevant information about the property that may be useful in the valuation process.

Information from the Owner

It is important to set up an appointment with the owner or operator to inspect the property and to discuss the operations that take place at the property. Part 2 of this Methodology Guide outlines the type of information that should be sought from the owner or operator of the property either before or during the inspection.

Review Municipal Plans

Municipalities have zoning and planning information available for all properties, especially areas in transition where there are often special studies or secondary planning documents. This type of information will be helpful in confirming that use as a pulp and paper mill is the highest and best use of the property and may assist in gaining a wider appreciation of value-significant features of the locality.

Internet

Along with maps and photographic records, the Internet has general information on most properties. Some of this information may be out of date, but a search of the Internet can often provide useful information about the nature of the area and the market. Articles about pulp and paper mills selling or being re-developed, information and statistics on pulp and paper and related manufacturing sectors, and general economic information can all be found on the Internet.

Property Inspection

The value of any large industrial property relates to its utility; how well/efficiently it serves as a base for the process for which it is used, i.e., in this case, a pulp and paper mill. Understanding a property and its utility requires a property inspection to gain insights into the condition and utility of the property and the nature of the locality and surrounding properties.

Before inspecting the property, the following steps are recommended:

- Prepare a list of questions that need to be asked (see Part 2 of this Methodology Guide).
- Arrange with the owner/operator to see the interior of the mill.
- Check with the owner to see if there are any safety requirements for the tour (hard hat, special shoes, safety glasses, high-visibility vest, etc.).
- If possible, review the site plans, building plans, floor plans, elevations and cross-sections.
- Take a camera (ensure the owner has provided permission for interior photos).
- Take a notebook, recording device or inspection sheet to note the nature, state and condition of the pulp and paper mill and any other properties inspected.
- If the pulp and paper mill requires measurement, take a measuring device.
- Let the owner know how long the inspection should take.

Inspecting the Property

- Take notes about the location of the pulp and paper mill.
- Note the access and egress to the mill.
- Review the use and condition of the parking lot.
- Ask questions about how the mill functions.
- Ask questions about other pulp and paper mills which may be used as benchmarks.
- Make notes of conversations as well as items seen during the inspection.
- Note the condition of the improvements (buildings, structures, etc.).
- Take photographs as required (with permission).

The inspection should establish all relevant details about the site improvements, their construction, condition, use, function and utility. Also, the property inspection provides an

opportunity to ensure that the record includes all the items that should be assessed, and that all items previously captured are still present in their stated form.

Details should be confirmed and notes made about the quality and type of construction materials and finishes used for the following:

- landscaping
- site preparation
- foundations
- framing
- walls
- floors
- ceiling structures
- roof coverings
- plumbing
- lighting/electrical
- heating, ventilation, air conditioning (HVAC)
- doors
- elevators
- stairs
- fire systems and sprinklers
- finishes
- paving
- yard improvements
- other assessable items

- availability of municipal services

The state and condition of these improvements should also be noted and comments made about whether a possible variance should be applied to the effective age of any improvement.

The assessor should take photographic records to supplement notes.

Assembly and Verification of Data

Once the property has been inspected, the assessor should use the observations to refine the data available and consider the application of the valuation process:

- Are there any valuation issues to be taken into account with respect to the subject property or its location?
- Are there any comparable properties that need to be considered?
- Is there any other new information to be considered?
- Is any additional research needed?

The assessor should now take steps to verify the data, to ensure that the records about the property are accurate, and that the data concerning any transactions relating to other comparable properties properly reflect market conditions.

Check Record of Improvements against Inspection Notes

The assessor needs to check to ensure existing records are up to date. Upgrades to roofing, lighting, and HVAC systems (those components with a shorter lifespan) often occur. Small additions are also made. The building records need to be updated to reflect the current state and condition of the property.

Evaluate Functionality and Utility

Utility reflects the use or usefulness of a property. The amount of utility is a measure of the benefits likely to be generated in the foreseeable future. Functionality concerns what a property can do and how efficiently it can perform those tasks. The more efficient and functional a property is, the greater the benefits that can be generated, the higher the utility, and the higher the value. The assessor needs to have a clear understanding of both the functionality and the utility of the pulp and paper mill to enable an accurate valuation to be prepared. Due to the specialized nature of the pulp and paper operation, the assessor will need to discuss both functionality and utility with the owner or operator of the mill.

Functionality

Evaluating the functionality and utility of a property requires points of comparison. Some points are general in nature; for example, a pulp and paper mill with a lot of excess space tends not to be as efficient in terms of operating costs when compared to a mill of a more appropriate size. Some points are specific to current operations; for example, a disjointed production flow. In both instances, the assessor has to understand the most appropriate replacements for the existing improvements and whether existing functionality and utility conditions affect the value of the property in comparison to a more efficient pulp and paper mill.

Establishing how well a property fulfills its desired functions requires knowledge of both the property and the processes being carried out there. An inspection may provide visual clues about how well the property works. The assessor should take note of any unused areas, excess or insufficient space or heights, or any process that seems inefficient, disjointed or out of place. Such occurrences may indicate the presence of functional obsolescence. However, a more complete determination of functionality and utility requires input from the operator of the property.

Functionality Questions

There are a number of questions that may help to build up a picture of the functionality of a pulp and paper mill; these include:

- Are there any areas where the building layout or design makes the process difficult or inefficient?
- Are there any unused areas?
- Are there excess heights?
- Is the clear height sufficient?
- Is access to the site adequate?
- Is the site large enough/laid out for current operations?
- Is the process disjointed?
- Are the property services adequate?

- How well do the building services work?
- Are the improvements in good condition?
- Has the intended use of any of the improvements changed?
- Is the property working one, two, or three shifts?
- How easy would it be to adapt the process to incorporate recent technological developments? (i.e., how flexible is the layout?)
- What is the cost of production compared to a modern, efficient pulp and paper mill?
- What components of the mill meet modern standards?

This Methodology Guide is concerned with the valuation of pulp and paper mills; the primary concern therefore is to assess how well the property meets the needs of a pulp and paper operation. However, if the property could be used for other similar purposes, possibly a different type of pulp and paper operation, consideration will need to be given to evaluating the functionality and utility of the property in relation to other possible uses.

Evaluate Property Utility

Utility is the ability of a property to satisfy a particular want, need or desire.

Functional utility is represented by the ability of a property or building to be useful and to perform the function for which it is intended, according to current market needs and standards; in other words, the efficiency of a building in terms of architectural style, design and layout.

Utility in the valuation process is addressed in the highest and best use analysis through consideration of the use of the property that produces the most profitable return.

Highest and Best Use

Determining the highest and best use is fundamental to establishing the current value of a property. It requires that the value determined be the highest amount that could be obtained for the reasonable use of that property under the current zoning environment. The market value of a property is predicated on a determination of highest and best use as defined below:

“The reasonably probable and legal use of vacant land or an improved property that is physically possible, appropriately supported, financially feasible, and that results in the highest value”.

[The Appraisal of Real Estate, third Canadian edition page 12.1]

This definition is further qualified as follows:

- Legal uses are those that qualify under existing government regulations – especially zoning by-laws.
- Uses that are physically possible on the subject site are uses that could be accommodated within the site configuration, location, size, or soil conditions.
- Appropriately supported uses restrict the potential options to uses that would be reasonably and probably considered by the market.
- Financial feasibility means the need for probable economic success of a potential use.
- The highest and best use must be the most profitable use for the entire property collectively – land, buildings, and other improvements.

The process of establishing highest and best use considers each of these points; eliminating uses that do not qualify under the various criteria and evaluating the feasibility and value of uses that meet the criteria.

A review of the state and condition of the improvements, the functionality of the property, and the expected utility allows for a more informed judgment on the highest and best use of the property.

In general, it is assumed that the highest and best use of a pulp and paper mill is likely to be the existing use. However, the question of highest and best use should still be examined to confirm this assumption.

When considering an alternate highest and best use, it is important to remember the principle of consistent use; this means the existing improvements have to be valued according to how well they may serve that alternate use.

For the purposes of this Methodology Guide, it is assumed that the highest and best use of the property to be valued is as a pulp and paper mill.

2. Determination of Cost New

The application of the cost approach to determine the current or market value of a property is based on the concept that it is possible to establish what it would cost a notional purchaser to replace the property with another of equal utility. When a property is new, or has very little life remaining, it is relatively easy to rationalise the amount such a purchaser would pay. It is the value during the period in between those two extremes that present challenges; this is where the task of ascertaining replacement costs, and identifying and quantifying depreciation, is necessary to enable the determination of current value.

The cost approach derives a value by estimating the cost to replace the functionality and utility of a property. As a reminder, in broad terms, this requires six steps:

1. Determine the functionality and utility of the property (what the property can do and how well it does it).
2. Establish the costs as new to construct the improvements that can complete these functions.
3. Identify all forms of depreciation.
4. Quantify all forms of depreciation (the difference between the cost as new and the market value of the improvements, i.e., the amount the improvements would sell for as of the valuation date).
5. Add the market (i.e., current) value of the land to the depreciated value of the improvements.
6. Validate the results of the above process.

Given the means to establish the cost new, i.e., using MPAC's costing system (ACS), the cost approach can be applied to value pulp and paper mills. This Methodology Guide is designed to assist the assessor to navigate through the valuation process and produce an accurate estimate of current value utilizing the recognized cost approach methodology.

Reproduction Cost New

Having assembled all the data needed to complete the cost analysis, including an inspection of the property, the next step is to derive a reproduction cost new.

Reproduction cost is defined by the Appraisal Institute as follows:

“The estimated cost to construct, as of the effective appraisal date, an exact duplicate or replica of the building being appraised, insofar as possible, using the same materials, construction standards, design, layout, and quality of workmanship, and embodying all the deficiencies, super-adequacies, and obsolescence of the subject improvements.”

[The Appraisal of Real Estate, 14th edition, page 569]

The assessor should be aware that it is sometimes advocated that the cost approach should start by using the replacement cost rather than reproduction cost. However, there are risks of inconsistency and double-counting within the valuation if replacement cost is used as the starting point. It should always be remembered that it is the actual pulp and paper mill which has to be valued, not a different property. That is why it is important to start the valuation processing by ascertaining the reproduction cost new of the mill.

Replacement cost is defined by the Appraisal Institute as follows:

“Replacement cost is the estimated cost to construct, as of the effective appraisal date, a substitute for the building being appraised using contemporary materials, standards, design, and layout.”

[The Appraisal of Real Estate, 14th edition, page 570]

In general, the assessor should start the cost analysis with reproduction cost new, although the use of replacement cost may be used at a later point in the valuation when considering the impact of depreciation.

Developing Cost New

After collecting the data, the assessor should evaluate the existing improvements and select the components from the information found in the ACS system that best reflects the existing materials and construction styles according to the quality and functionality of those improvements. Adjustments for replacement materials are discussed below.

Cost estimates of other structures and improvements such as yard improvements, fences, paving, lighting, etc. are then added.

Once the cost parameters are entered, the ACS system will provide a summary of reproduction costs new for the pulp and paper mill. It is then a matter of determining any adjustments to reflect depreciation.

The ACS system produces cost estimates that reflect a “whole building”, i.e., foundations, floor structure, frame and span, exterior base walls and additives, roof finishes, interior finishes, building services (including electrical, plumbing, HVAC, fire protection, etc.) and other built-ins.

The assessor should be aware that ACS component costs include labour, material and equipment prevailing at the relevant valuation date; costs also reflect geographical variations within Ontario.

An example of the output from the ACS system is shown in Table 1 below:

Table 1

Municipal Property Assessment Corporation											
This Assessment Information was generated from an independent format. Reference your Assessment Notice for current Roll values and coding.											©Copyright - All rights reserved Municipal Property Assessment Corporation Not to be reproduced by any means or distributed in any manner, in whole or in part, without prior written permission
PROPERTY DETAILS - STRUCTURE ASSEMBLY VALUE LIST											
Market Value Base Year : 2005						Valuation Method : ACS					
Building: PUMP HOUSE		Life Table: OR50		(Totals: Total RCN = 24,054		% Good = 20.00		Obsolescence Amt: 1,203)			
Structure Element	Element Group	Assembly Description	Area/ Quantity	U/M	Net Rate	Add Fctr.	RCN	Asmb Eff Yr	% Obs.	% Good	Net Value
FOUNDATIONS	FOUNDATION WALL ON STRIP FOOTING - CONCRETE	WALL 4" DEPTH <=12" THICK	36.00	LF	131.84		4,746		5.00	20.00	902
FLOOR STRUCTURE	LOWEST CONCRETE FLOOR (ON FILL)	LIGHT <= 4" THICK	144.00	HSF	4.45		641		5.00	20.00	122
STR. FRAME & SPAN - 1ST FLOOR	LOAD BEARING - WOOD FRAME ROOF >10 <45 SLOPE (NOT INCLUDING ROOF FINISHES)	SPAN <=30'	144.00	HSF	4.06		585		5.00	20.00	111
EXTERIOR WALLS - BASE	BASE WALL - MASONRY	>8" THICK - SOLID BRICK	307.80	SF	42.29		13,017		5.00	20.00	2,473
EXTERIOR WALLS - BASE	BASE WALL - WINDOWS	WOOD FRAMED DOUBLE HUNG	34.20	SF	31.50		1,077		5.00	20.00	205
ROOF FINISHES	SLOPED ROOF (INCLUDING ALLOWANCE FOR AVERAGE ROOF SLOPE)	METAL - LIGHT 30 TO26 GA PREFINISHED	144.00	HSF	4.67		672		5.00	20.00	128
FLOORS WALLS & CEILINGS	CEILING - SUSPENDED ON FRAME	DRYWALL - PAINTED	144.00	HSF	2.60		374		5.00	20.00	71
FLOORS WALLS & CEILINGS	WALLS - APPLIED TO SURFACE	REGULAR PAINT	307.80	VSF	0.67		206		5.00	20.00	39
ELECTRICAL	LIGHTING - OPEN STRIP FLUORESCENT	AVERAGE >=.50 <1.00 WATTS/SQ FT	144.00	HSF	2.31		333		5.00	20.00	63
HEATING & COOLING	HEATING - ELECTRIC BASEBOARD OR RADIANT	AVERAGE	144.00	HSF	1.00		144		5.00	20.00	27
OVERHEADS	OVERHEAD EXPENSES	QUANTITY ADJ. FACTOR	21,795.00	\$	-0.11		-2,397		5.00	20.00	-456

3. Identification of Depreciation

Depreciation has been defined as:

"The loss in utility and hence value from any cause."

[Basics of Real Estate Appraising, Appraisal Institute of Canada, 1991, page 284]

Depreciation is the difference between costs new and the market value of the property improvements. There are three classes of depreciation to consider:

1. Physical Depreciation
2. Functional Obsolescence
3. External Obsolescence

Both physical and functional depreciation can be sub-divided into two types:

1. Curable (where it is cost-effective to fix).
2. Incurable (where it is not cost-effective, or impossible, to fix).

All elements of depreciation affect the value of a property.

Physical depreciation - deterioration due to age - is a relatively simple and straightforward concept and is therefore widely understood, but functional and external obsolescence are more complex. Various definitions of functional and external obsolescence exist, but the following are used by the Appraisal Institute:

***Functional obsolescence** is caused by a flaw in the structure, materials, or design of an improvement when the improvement is compared with the highest and best use and the most cost-effective functional design requirements at the time of the appraisal. A building that was functionally adequate at the time of construction can become inadequate or less appealing as design standards, mechanical systems, and construction materials evolve.*

Functional obsolescence is attributable to defects within the property lines, in contrast to external obsolescence, which involves conditions outside the property lines and therefore outside the control of the owner and occupants. Functional obsolescence, which may be curable or incurable, can be caused by a deficiency - that is, some aspect of the subject property is below standard in respect to market norms. It can also be

caused by a super-adequacy - that is, some aspect of the subject property exceeds market norms.

[The Appraisal of Real Estate, 14th edition, page 623]

***External obsolescence** is a loss in value caused by negative externalities, i.e., factors outside a property. It is almost always incurable. External obsolescence can be temporary or permanent. For example, value loss due to an oversupplied market may be regained when the excess supply is absorbed and the market works its way back to equilibrium. In contrast, the value loss due to proximity to an environmental disaster may be permanent.*

In the aftermath of the financial crisis of 2008, external obsolescence in oversupplied real estate markets was significant, but those losses in value were not expected to be permanent in areas where the economic base was sufficiently diverse to eventually recover. External obsolescence is sometimes called economic obsolescence because economic factors outside the control of property owners, like mortgage interest rates and changing employment levels, can have large effects on the value of real estate.

External obsolescence usually has a market-wide effect and influences a whole class of properties, rather than just a single property. However, external obsolescence may affect only one property when its cause is location, e.g., proximity to negative environmental factors or the absence of zoning and land use controls. In fact, the causes of external obsolescence can be broadly characterized as either market obsolescence or locational obsolescence. Most properties experience market obsolescence from time to time as a result of the natural expansion and contraction of the real estate market. In contrast, locational obsolescence is caused by proximity to some detrimental influence on value such as heavy traffic, a landfill, or other undesirable land use outside the property being appraised. For both market and locational obsolescence, the value-influencing factor is outside the property and outside the control of the property owner and occupant.

[The Appraisal of Real Estate, 14th edition, pages 632-633]

Depreciation can be quantified in a number of ways (see step 4 below), but in order to help with the quantification process, it is first important to identify all the forms of depreciation that are present at the pulp and paper mill.

Identifying Depreciation due to Age

All properties suffer physical decline as they age. The amount of depreciation applied depends on three factors:

- The expected life assigned to the building or structure.
- The quality of the construction.
- Whether any variance to the effective age has been identified by the assessor.

Improvements - Life Expectancies

The life of an improvement can be characterised in three different ways:

1. Economic life – the period where the utility of the improvement is positive, i.e., it contributes to the value of the operation. An improvement can have more than one economic life under different uses.
2. Useful life – the period of time over which the components of the improvement may reasonably be expected to perform the functions for which they are designed¹.
3. Physical life – the period until an improvement deteriorates to the point where it becomes unusable.

Age-related depreciation is generally applied on the basis of the effective age of a structure². A brand new pulp and paper mill has very little depreciation (if any), whereas a mill approaching the end of its economic life is likely to have a significant amount of depreciation.

The ACS system reflects physical depreciation from normal wear and tear by reference to useful life tables. However, where necessary, the assessor can override the age-related useful life table by using an effective age input. It should be noted that overriding the ACS age-related table can lead to difficulties and inconsistencies within the valuation, so it should be done with caution and only where it is clearly warranted.

¹ The Appraisal of Real Estate – Third Canadian Edition, Sauder School of Business. Page, 19.6

² Effective age should relate to the state and condition of the improvements taking into account when the improvements were built and their remaining economic life; however, the average actual build date of the improvements (weighted by size or costs new) is often used as a proxy for effective age.

Quality of Construction

There are typical life expectancies for all types of industrial improvements depending on their construction and use. For example, typical metal frame construction tends to have a 50 year life expectancy. In general, the more robust the improvements, the longer the life expectancy.

Most buildings found at a pulp and paper mill would be assigned a typical expected useful life based on construction styles. However, there may be some more intensive or specialized uses at a particular mill that tend to shorten the life of a property due to greater physical wear and tear.

Variances in Effective Age

If additional depreciation is required to adequately capture the difference in value between cost new and current value, it can be accomplished by adjusting the effective age or adjusting the expected useful life. However, the assessor should note the concerns about making such adjustments stated previously.

A determination of effective age is completed by evaluation of the physical state and condition of the improvements. If the condition of the improvements is typical for the age of the structure, then no adjustments are required. If the improvements are worse than typical, then an age variance can be applied (assigning an older effective age increases the depreciation). If the improvements have recently been upgraded or renovated, then the effective age can be raised; this lowers the amount of age-related depreciation applied by the ACS cost system.

Evaluating Physical State and Condition

During the inspection, items that were in poor repair should have been noted. Items in poor repair should be addressed as follows:

- Does the item requiring repair or replacement change the remaining useful life of the property or that part of the property that is affected? The assessor should attempt to determine from the owner or operations personnel if there are any excess operating costs associated with the condition.
- If repair or replacement is required in the immediate future, the assessor should request any information or studies completed on the estimated costs.

- If the condition of the improvement changes the effective age of the component, the physical depreciation of that component should be adjusted to reflect its change in value.
- If the repair or replacement is a matter of deferred maintenance, the assessor should determine if the condition changes the amount that a purchaser would pay for the property.

The assessor should make a note of the improvements/items requiring additional consideration.

If the improvement is in poor condition, has suffered from unusual environmental conditions (for example, flooding), or has been poorly maintained, then the effective age should be adjusted to indicate an older building; this will result in higher rates of depreciation.

Deferred Maintenance and Cost to Cure

In addition to general depreciation due to age, there may be specific elements in the pulp and paper mill that require more detailed analysis: for example, the property, or part of it, may be in need of a new roof in order to continue operations.

Deferred maintenance occurs when the property has not been properly maintained and the item (e.g., a leaky roof) suffers from premature loss in value. Cost to cure issues arise when, in the normal life of the property, a particular item (e.g., the roof) has to be replaced.

In both instances, i.e., the need to repair or replace, the potential purchaser of the pulp and paper mill would be out of pocket by the amount it would cost to fix the issue. In both instances, after the problem is fixed, the value of the property will increase. However, until the money is spent on remedial works, the property is affected by depreciation.

Clearly the typical purchaser would pay more for a pulp and paper mill with a fully effective roof than a mill with a leaky one (all other factors being equal). If the replacement of the building component would be done by a purchaser as of the valuation date, then any value remaining in the component being replaced should be deducted from the property value. If the condition exists, but only calls for remedial action over time, then only a portion of the existing value should be deducted.

However, there is typically an additional element of depreciation involved as well: the difference in the cost of repair versus the cost to install the building component as if it were being constructed when new.

The amount of this depreciation is often difficult to quantify. Whereas ACS will be able to provide an estimate of how much it costs to build a roof as new, the cost to fix/rebuild an existing roof can be more challenging to estimate. For example, assume a pulp and paper company does not want (or cannot afford) to stop normal production and, as a result, the roof work has to be undertaken at night during the time when a third shift would be in place. In such a case, all construction materials and equipment would have to be put away before production resumed in the morning. The cost of completing the repair work in this way would be much higher than building a new roof in a new mill. Typically, the estimates for such cost to cure projects are not readily available, so an estimate has to be made.

Despite these limitations on calculating an accurate depreciation amount for cost to cure, it remains important to identify situations where such depreciation exists and to make some form of deduction from value. Such adjustments may best be done by increasing the effective age of the structure to increase the amount of physical deterioration applied.

Table 2 shows a simple example of the difference between the cost of a roof component at the time of constructing a new pulp and paper mill and the cost to replace one in situ, i.e., the cost to cure to be deducted from the reproduction cost new.

Table 2

Item	Cost (as part of RCN – ACS)	Cost to Cure (separate cost)
Roof	\$150,000	\$200,000
Ancillary works	\$25,000	\$50,000
Total	\$175,000	\$250,000
Curable physical deterioration		\$250,000

Table 3 shows a more detailed example of excess costs and their impact on value.

Table 3

Obsolescence	Annual Excess Costs	Costs of Correction	Capitalization of Costs @	Affect on Value
			6.4176	
1. Heating	\$1,128,518	\$3,954,100	\$7,242,377	\$3,954,100
2. Security	\$500,698	n/a	\$3,213,279	\$3,213,279
3. Clear Heights	\$1,126,100	n/a	\$7,226,859	\$7,226,859
4. Material Flow	\$1,274,000	n/a	\$8,176,022	\$8,176,022
5. Roof Conditions	n/a	\$809,905		\$809,905
6. Paving Conditions	n/a	\$662,101		\$662,101
Totals	\$4,029,316	\$5,426,106		\$24,042,267

Note: Assumes a discount rate of 10% and a life expectancy of 10 years.

Functional Obsolescence

The two main questions in relation to functional obsolescence that need to be considered by the assessor are:

1. **Identification** - does it exist and, if so, what type of functional obsolescence is it?
2. **Quantification** - what method should be used and how should it be applied?

Identifying Functional Obsolescence

The existence of functional obsolescence can often be identified by addressing several questions:

1. Are there excess operating costs inherent in the operation of the existing improvements?
2. Are there any inefficiencies in the improvements - excess space, excess height, or disjointed layout/construction?
3. Could the existing improvement be replaced with a more modern, efficient substitute, and, if so, what would the modern replacement building consist of?
4. How would a potential vendor or purchaser view this property?

These questions should be discussed with the pulp and paper mill operations or facility manager. The assessor should attempt to get a sense of the seriousness of the problems encountered (if any) in the operation of the property. It is also necessary to determine whether these problems relate to the real estate alone or a combination of real estate, machinery and equipment and/or other business factors.

A pulp and paper mill that is inefficient or costs more to produce an item than its modern counterpart may be suffering from functional obsolescence and may have lost some value. One way to measure this impact is to establish the amount of the excess operating cost and convert it into a present value. For example, an older, inefficient HVAC system may cost \$25,000 more per year to operate than a more modern system.

It is sometimes difficult for the assessor alone to make such a determination. Assistance is often required from the pulp and paper mill owner or operator. Typical examples of excess operating costs include:

- Excess costs of heating or other services.
- Excess costs of internal goods movement due to inefficient layout.
- Excess maintenance costs.
- Costs of carrying excess space.

By addressing these and similar questions, it becomes possible to identify the presence of functional obsolescence. Methods of quantifying this obsolescence are discussed in the next section of this Methodology Guide.

External Obsolescence

As with functional obsolescence, the two main questions in relation to external obsolescence that need to be considered by the assessor are:

1. **Identification** - does it exist and, if so, what has given rise to the external obsolescence?
2. **Quantification** - what method should be used and how should it be applied?

Identifying External Obsolescence

There are a number of factors that may produce external obsolescence including:

1. A change in market demand for the products or services. In such cases the pulp and paper operation may have lost some ability to generate revenue and therefore the value of the mill may have gone down. For example, the demand for newsprint has reduced due to changes in the way in which consumers prefer to obtain news, e.g. through electronic devices, causing over-capacity in the industry.
2. A change in the attractiveness of the location. Commonly referred to as locational obsolescence, this decline in value is caused by a variety of factors that change the attractiveness, and therefore value, of a location. For example, the closure of an existing highway may adversely affect the value of properties in a particular locality.
3. A change in government restrictions or regulations. For example, a new regulation that means additional environmental remediation measures have to be taken may result in a requirement to spend money with a corresponding reduction in value of mills that do not yet comply with the new regulations.
4. Physical site restrictions. The demand for a service may be such that expansion is desired. However, due to zoning or physical restrictions, this may not be possible on the existing site. Anything from the unfulfilled need for more parking spaces to a desired building expansion may cause this form of external depreciation.
5. A decline in general economic conditions. A recession can cause a drastic and long-term fall in the demand for pulp and paper products. This may result in creating oversupply situations for pulp and paper operations and a corresponding drop in demand and value for the properties used for producing pulp and paper.
6. Changes in the sources of supply. Pulp and paper mills can suffer from changes in sources of supply which makes the property being valued less attractive (or more attractive) and, therefore, less (or more) valuable.
7. Changes in the availability of services. Municipal restrictions on waste disposal, the closing of a rail spur line, and other similar changes in services can cause a decline in value due to this type of external obsolescence factor.

In the case of more specialised properties such as pulp and paper mills, it may be necessary to undertake a review of information obtained from the property owner and the industry which will help to:

- Determine past, current and expected production levels.
- Establish capacity utilization.

- Research the industry, establish the profitability of the industry.

More detailed factors to consider in this connection are shown in Part 2 of this Methodology Guide. Many of these factors will be included in MPAC's Market Valuation Report which forms part of the Level 2 Disclosure.

If it is necessary to seek this type of information, assistance from the property owner or operations manager is helpful. Other resources include:

- trade publications
- Statistics Canada data
- industry studies
- reports on similar properties

The objective is to determine whether the cost analysis should incorporate an external obsolescence allowance and/or whether a replacement cost based on a modern facility is warranted.

It follows that, in order to identify the presence of external obsolescence, the assessor needs to study:

- changes in product demand
- changes in the financial performance of companies in the industry
- changes in competition – locational factors

It is also important to gain some understanding of the reason for these changes, (e.g., general economic recession; development of a more efficient manufacturing process elsewhere; etc.) in order to understand the nature (extent and longevity) of the obsolescence condition.

The pulp and paper industry is susceptible to changes in consumer tastes which may have an impact on the value of mills, particularly if they are not flexible enough to be able to change their operations to match changes in demand for their products.

To establish external obsolescence, the assessor has to be satisfied that the causes for any reductions in revenue and profits stem from factors outside the control of the property owner or operator, e.g., general economic recession, or increased competition. Poor business performance does not always imply obsolescence. There are a number of reasons why

particular companies may experience reduced revenue and/or profit apart from the impact of external factors.

4. Quantifying Depreciation

Depreciation in total is the reduction in value of the existing improvements in comparison with costs new. There are various aspects of depreciation:

“Loss in value of an object, relative to its replacement cost, reproduction cost, or original cost, whatever the cause of the loss in value. Depreciation is sometimes subdivided into three types: physical deterioration (wear and tear), functional obsolescence (sub-optimal design in light of current technologies or tastes), and economic obsolescence (poor location or radically diminished demand for the product).”

[Property Appraisal and Assessment Administration, IAAO, 1990, page 641]

There are a number of ways to quantify depreciation including:

1. **Market extraction** - determining the typical global amount of depreciation from cost new based on the evidence of properties that have sold.
2. **Age-life approach** - where total depreciation is estimated (usually on a straight line basis) by determining the current life of the property as a ratio of the expected total economic life.

Both these methods are based on the demonstrated sales values of similar properties. Knowing how long a property is expected to last (economic life), and its value at the end and other points of that life, enables the prediction of value from cost new to a point in its life.

These two methods are reasonably simplistic in approach and work well with groups of properties that have common characteristics under typical conditions. They rely on the appropriate sales and life data being available. Examples of how they may be applied are shown in step 6 where they are used for checking the quantum of depreciation deducted rather than as a method of calculating the amount to be deducted.

As already indicated, there are very few, if any, sales of large pulp and paper mills that might allow either of the above approaches to be used. For that reason, a different approach - the breakdown approach – should be used (see below).

Breakdown Approach

The breakdown approach involves each component of depreciation being identified and quantified separately. The breakdown approach is the most comprehensive and detailed way to measure depreciation as it segregates total depreciation into the three individual parts, i.e., physical deterioration, functional obsolescence and economic obsolescence. It is also cumulative with each step building on the results of the previous step until all forms of depreciation have been considered. In this way the assessor can gain a better understanding of the impact of all forms of depreciation on the pulp and paper mill that is being valued.

The steps in the breakdown approach are as follows:

1. **Estimate Replacement Cost New** - adjust reproduction cost new for excess capital costs, over-building and excess space; this produces replacement cost new.
2. **Estimate Physical Deterioration** - apply depreciation rates from ACS then, if appropriate, calculate the effects of any deferred maintenance and costs to cure to further revise the replacement cost new.
3. **Estimate Functional Obsolescence** - calculate and apply functional obsolescence.
4. **Estimate External Obsolescence** - estimate and apply external obsolescence.
5. **Determine the Depreciated Value** - of buildings and other improvements.

As already indicated, the breakdown approach has the advantage of being able to look at, and quantify, the impact of each aspect of depreciation affecting the property. This allows for the quantification of depreciation in abnormal or non-typical situations.

Quantifying the various components of depreciation in the breakdown approach is explained below.

Replacement Cost Analysis

Replacing Construction Materials during Cost New Analysis

There are a number of techniques and materials that can be used to construct the type of large industrial buildings used in pulp and paper mills. There may be a functional reason why one material was chosen over another for the existing property. For example, flooring may be built to a higher specification than a normal industrial building to reflect the additional loading requirements of a pulp and paper mill. Although less expensive materials could be used in a general replacement building, they would not meet the specification for a pulp and paper mill;

therefore the more expensive building material is used for a reason and would not be replaced by a less expensive option.

On the other hand, some properties may be over-built and would not be rebuilt as they stand. For example, a pulp and paper mill may have once required extensive finished product storage facilities on-site. A move to “just in time” operations may have rendered such storage facilities no longer necessary and therefore they may not add value to the property.

It should be noted that, although replacing existing construction materials might be considered in connection with *replacement cost new*, this approach should not be taken at the earlier stage of the valuation when considering *reproduction cost new*.

The following is a list of some of the issues that should be considered by the assessor when evaluating construction materials, techniques and costs.

Layout of Buildings

A pulp and paper operation that has evolved and expanded over time may have a tendency to have disjointed production flows. Evaluating the functionality of such a mill may involve recognizing any inefficiencies caused by the layout of the existing buildings. The assessor should consult the owner or operator of the pulp and paper mill to obtain reliable information about this issue.

Used and Unused Areas

During the property inspection, the assessor should have been able to identify any areas of buildings that are not being used. The assessor should have queried the reason why the space is unused with the owner or operator of the pulp and paper mill and reached a conclusion whether or not the lack of use is likely to be permanent.

Another issue may be any excess height and the unused vertical space in a building. Before the existence of excess height can be determined, the assessor should address the question of why the structure was constructed to its current height and determine if that height or the “extra” area adds value to the property. It should be noted that the critical factor for most large specialized industrial properties is not the actual height of the building but the clear height, i.e., the distance from the floor to the bottom of the roof trusses. However, the assessor also needs to consider whether any unused space, height, land, etc., only relates to the way in which the current operator uses the property and whether another operator within the pulp and paper industry might fully utilize the space available.

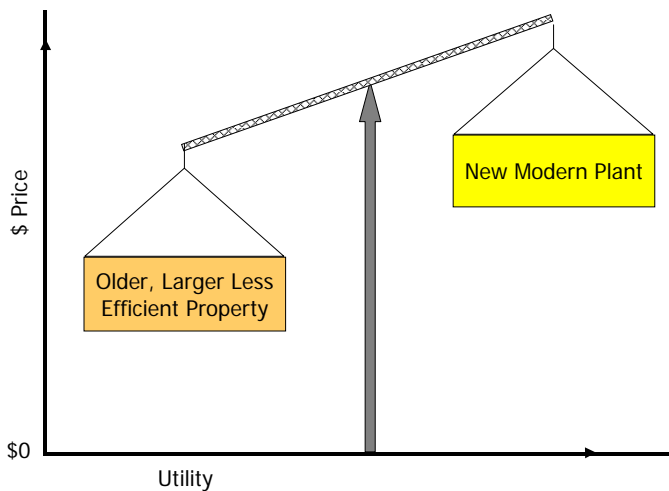
Determining whether there is excess land within the site may be more difficult, but it is usually possible to identify the potential for excess land. This may need to be reflected when the value of the land is being considered later.

Modern Replacement Mill

Designing and costing a modern replacement mill addresses the “buy existing or build new” issue facing a potential purchaser of the subject property. In other words, the decision whether to:

- Build a new pulp and paper mill that satisfies all the functional needs and expectations, or
- Purchase an older existing pulp and paper mill with less functionality and lower utility, but at a lower price.

Choice Facing Purchaser - Utility / Price Scale



A reproduction cost new determines the cost to replicate the existing improvements with a new pulp and paper mill of similar functionality.

The “model replacement” mill approach may be used in situations where the existing improvements are significantly over-built in relation to current needs.

The “model replacement” or "green field" approach starts by replicating all the functions and utility present in the existing property, while taking advantage of the advances and

field to produce a fully functioning, modern, efficient pulp and paper mill. The analysis should be considered on the basis of a realistic evaluation of the requirements and capabilities of the existing property, and what would be required to replace it. Constraints such as current location, site size and zoning by-laws should be taken into consideration.

If completed properly, the difference between the cost new of this modern building and the cost new of the existing property represents the excess capital costs or functional obsolescence due to the overbuilt nature of the existing property.

By comparing the subject property to a modern facility, it becomes possible to identify and evaluate the following aspects of the existing property:

- functionality
- excess operating costs
- excess construction costs.

A replacement model approach takes a significant amount of design expertise to provide realistic detail about the improvements sufficient to enable the completion of a cost analysis and to ensure that all the necessary functionality is present.

The assessor should take into account the views of the owner or operator of the pulp and paper mill when considering whether or not the existing facility would be replaced by a significantly different design and, if so, where information about that type of facility (and the cost to build it) may be found.

Replacement of Building Components

In addition to the overall replacement concept, there will be situations when only part of the property would be replaced. Under this approach, it is possible to go through the pulp and paper mill, component by component, and make evaluations as to the utility of each element. In this instance, the deduction for depreciation due to super-adequacies would be the summation of the individual calculations.

For example, a pulp and paper mill may have a warehouse that is only 50% used because the operation now uses “just in time” supplies so no longer needs as much storage space as it had when originally constructed. In such instances, the analysis of cost new would be the same as normal apart from the deletion of the old warehouse section and the addition of a warehouse that is 50% smaller (assuming that the “surplus” space in the existing property is permanent and there is no alternative use for it).

Quantifying Depreciation Due to Age and Condition

As already indicated, the ACS system has built-in tables that account for the typical amount of depreciation due to age. Under typical conditions, each building component (office area, receiving area, processing area, storage area, etc.,) is assigned a depreciation rate (% Good) according to the effective build date and the life expectancy.

The assessor should refer to the ACS example (Table 1) to see how the depreciation rate (% Good) is used.

Quantifying Functional Obsolescence

In broad terms, the quantification of incurable physical deterioration and incurable functional obsolescence can be found by deducting replacement cost new from reproduction cost new. However, it is helpful to consider the issues in more detail as set out below.

There are different methods used to quantify the various aspects of obsolescence. Difficulties in quantifying obsolescence arise where there is no established market place which can be used to form comparative judgments either in terms of income potential, market sales values or efficiency benchmarks. In these situations, the losses in value due to obsolescence can generally be identified, but the estimation of the extent of the impact on value is sometimes more difficult.

Another way to consider physical depreciation and functional obsolescence is to examine the excess operating costs that might be incurred from operating a sub-optimal pulp and paper mill.

Capitalization of Excess Operating Costs Analysis

A prudent purchaser will take into account all cash outlays (expenses) when considering the price of a property. If the property creates inefficiencies or increased production costs due to its layout or building services, then the purchaser will factor these costs into a purchase decision.

Excess operating costs are those costs that arise as a result of the inefficiencies inherent in the real estate used by the existing pulp and paper operation in comparison to a more efficient operation. They negatively impact the value and can be measured by capitalizing the amount of excess costs. Excess operating costs will affect value even after the replacement model approach is considered.

For example, a building at a pulp and paper mill may have an old HVAC system that results in an additional \$25,000 per annum to the operating cost in comparison with a more efficient, modern system. This extra cost makes the subject property less attractive and therefore less valuable than a pulp and paper mill with an efficient system. This additional annual cost can be capitalized and the capital sum deducted as part of the functional obsolescence calculation.

There is a risk of confusion when using replacement costs and it is important that the valuation approach is consistent. If a modern replacement pulp and paper mill is being considered for the purposes of calculating the amount of depreciation impacting the existing mill, the replacement will be assumed to have a modern HVAC system. However, that does not detract from the fact that the existing pulp and paper mill has a less efficient HVAC system and the excess operating costs associated with the HVAC system at the existing mill will still therefore need to be deducted.

What Constitutes Excess Operating Costs?

Any excess operating costs or inefficiencies attributable to the real estate (improvements or site) should be considered as a form of depreciation. Costs that relate to the business (labour, management, machinery, etc.), while they may have long-term impacts on the economic viability of the property, should not be considered as part of functional obsolescence in the property valuation process.

Typically, the following factors give rise to excess operating costs:

- Inefficient heating, air conditioning and/or ventilation systems.
- Poor property design or layout causing excess materials handling costs, including extra costs for personnel and equipment.
- Poor property design and/or excess space causing extra maintenance and other operating costs.

Capitalizing Excess Operating Costs

To complete the analysis of the impact of excess operating costs requires knowledge of three elements:

1. The remaining economic life of the property, i.e., how long these excess costs are going to continue to be incurred.
2. An appropriate capitalization rate (generally the cost of funds for that industry).

3. The effective corporate tax rate and whether the property is expected to make profits.

The remaining economic life of the property impacts on how long these excess operating costs are expected to last. The capitalization rate converts the annual cost into a present value and the annual costs are reduced by the effective tax rate because these extra costs reduce profit and, as a result, the company will pay less tax.

There are several ways to rationalize a capitalization rate. Some inference can be drawn from the capitalization rates found in sales transactions in the market for other types of investment such as long-term interest rates for various types of financial instruments; however, a more rational approach is to develop the cost of funds for a typical purchaser (see example below).

Impact of Excess Operating Costs

When studies done during the depreciation identification stage result in confirmation of excess operating costs, their impact is estimated by capitalising the future costs into a present value. For example, a pulp and paper mill is overbuilt and, as a result, it has two extra employees to perform maintenance work with a total annual cost of \$150,000 per year. The owner of a new pulp and paper mill does not have this cost. Noting that the economic life of the pulp and paper mill is expected to last another 5 years, and that the current corporate tax rate is 25%, the impact on value of the excess operating costs at \$150,000 per annum may be calculated as shown below in Table 4:

Table 4

Element	Annual Cost	Tax adjustment	Period (years)	Factor at 8%	Functional obsolescence
Additional cost relating to excess area	\$150,000	-25%	5	3.9927	\$449,180
Rounded					\$449,200

Note: for illustrative purposes only.

To explain how the above table works, it has been determined that there are excess operating costs as a result of additional employees related to the mill which amount to \$150,000 in

extra expenses per annum. What needs to be determined is what the discount to the overall value this additional expense would have, since the facility was measured on the cost method and we cannot simply deduct it from an income stream.

If the resulting excess costs is considered to be an income stream, it would be necessary to determine the after-tax cost to the company for hiring those additional workers. If the pre-tax expense is \$150,000, and the corporate tax rate (which varies by jurisdiction and company type) is 25%, then the after-tax cost to the company would be $(1-.25)*150,000 = \$112,500$. This is, effectively, the annual amount which an owner would have to pay to maintain an older, inefficient facility in comparison with a more modern facility.

It is then necessary to consider what discount a potential purchaser looking to buy the facility would attribute to this additional expense. A purchaser would effectively reduce the purchase price by the present value of the future outflows of cash; it can be calculated like an annuity. In calculating the present value, two items have to be considered along with the cash flow amount; the life of the asset (how many periods to assume the payment needs to be made for) and the discount rate. The economic life of the facility/asset has been determined to be 5 years, so it is necessary to expect a purchaser to have to pay out 5 additional expense payments. The discount rate has been reviewed by analysis of interest rates, bond rates and sales of similar assets and has been set at 8%.

There are a number of places to find the factor which is used to multiply the cash flow payment in order to determine the present value. This includes present value tables, excel functions and/or scientific calculators. When the present value tables using 5 years and 8% discount rate is used, a factor of 3.9927 is determined. This factor is multiplied by \$112,500 to find that the present value of 5 years of expected cash outflows would be \$449,180 (rounded).

It will be seen from Table 4 that the impact on the current value as a result of excessive building area and two extra employees at \$150,000 (salary and benefits) has been taken to be \$449,200.

As a dollar amount deduction, it becomes important at what point in the process this functional obsolescence depreciation is applied. When a potential purchaser compares two properties with similar functionality, one with excess operating costs and one without, the impact of \$449,200 comes after the physical deterioration and replacement issues have been considered, but before any external obsolescence impacts which are beyond the control of the property owner, and which may or may not change in the future. Therefore, it is at that stage in the valuation that an adjustment needs to be made by the assessor for this factor.

Functional Obsolescence when no Excess Cost Information is Available

As is often the case, the detailed cost information needed to calculate the impact of functional obsolescence may not be readily available. In these situations, the functional obsolescence should be recognised by the assessor and a judgment made as to the percentage impact it is likely to have on the purchase price of the property. This type of deduction can be applied as a percentage deduction on a component by component basis, or by a property-wide deduction.

Quantifying External Obsolescence

“External obsolescence is a loss in value caused by factors outside the property. It is often incurable. External obsolescence can either be temporary (e.g., an oversupplied market) or permanent (e.g., proximity to an environmental disaster). External factors frequently affect both the land and building components of a property’s value. External obsolescence usually carries a market-wide effect and influences a whole class of properties, rather than just a single property. External obsolescence may only affect the subject property when its cause is location - e.g., proximity to negative environmental factors or the absence of zoning and land use controls.”

[The Appraisal of Real Estate, Twelfth Edition, Appraisal Institute, page 412.]

The key issues producing external obsolescence are:

1. Significant change in demand for product.
2. Mill not working to capacity.
3. Costs of production no longer competitive

To understand external obsolescence, the assessor needs to understand why these things have happened and if they are happening to other producers. It is important to consider whether the external conditions affecting the property would normally translate into a physical change in the property (e.g., size, configuration, etc.). Alternatively, if property changes do not address the issue, what is the loss in value as a result of this type of obsolescence?

As with the application of the other forms of depreciation, external obsolescence is usually expressed as a percentage of cost new and deducted from the replacement cost value less physical and functional obsolescence.

Methods of Quantifying External Obsolescence

Studying changes in factors like capacity usage ratios and gross margins can assist in quantifying this type of obsolescence, but external obsolescence tends to be industry and property specific in nature. Establishing market (i.e. current) value is best achieved by the assessor assuming the role of a potential purchaser, i.e., a “knowledgeable” purchaser. For properties with a specific highest and best use such as pulp and paper mill, this study will involve research into the industry and recent changes in that industry, a view to the future of that industry, and specific knowledge about the location and other “local” factors affecting the specific property.

Part 2 of this Methodology Guide contains more detailed information about the factors to consider in connection with ascertaining whether there is external obsolescence and, if so, how it may be quantified. It should be noted that MPAC produce Market Valuation Reports for each reassessment as part of its Level 2 Disclosure process; these reports will assist the assessor in reaching a conclusion about whether or not an adjustment needs to be made for external obsolescence and, if so, what the quantum of that adjustment should be.

Where the presence of external obsolescence has been identified, the impact can be quantified using the following steps:

1. Complete a detailed study of the industry - in this case, the pulp and paper industry - and the economic factors that are affecting it and establish the degree (or range) of the changes taking place in the industry.
2. With the assistance of the owner or operator, analyse the performance of the pulp and paper mill being valued (i.e., units produced, profits or losses, cost per unit, etc.) and compare it to the industry standards. This can identify whether there are more issues concerning the subject property (e.g., operating cost issues, locational issues, etc.) than at other similar pulp and paper mills.

The degree of value loss should reflect the magnitude of the changes in the property. Quantifying external obsolescence in respect of the real estate is sometimes challenging because the conditions invariably also impact on the business value of the operation.

The three traditional methods of quantifying external obsolescence are:

1. Establish total depreciation using market-extraction or other approaches to value then use a “residual” approach to determine how much obsolescence remains after quantification of the other forms of depreciation.

2. By considering stock or other financial measures, determine the magnitude of the loss for the business due to external obsolescence, then “translate” the finding to apply to the real estate component.
3. Find comparative value data for similar properties not affected by the obsolescence and determine the differences in value. This could also be an analysis of “paired sales” data where a property was sold before and after the obsolescence condition, or paired income data where lease rates have changed before and after the obsolescence condition. Where valuation dates are in the past, such “pairing” of data could be forward or backward looking.

More sophisticated approaches may involve a “utilization analysis”, a “return on capital analysis”, an “equity to book ratio analysis”, and/or a “gross margin analysis”; however, these approaches usually require specialist expertise and the assessor may not be expected to undertake these forms of analysis without expert assistance.

An attempt should be made to use one or more methods to quantify the obsolescence. If, because of the lack of comparable sales/value data, this is not possible, the assessor should make a judgment and attempt to support the rationalization. The important point is that the presence of external obsolescence, assuming it exists, has been properly identified and that a reasonable allowance needs to be made for this factor.

The appropriate adjustment for external obsolescence in respect of pulp and paper mills, along with an explanation of the rationale for the guidance, will be contained in the market valuation report prepared by MPAC for the pulp and paper industry as part of its Level 2 Disclosure process.

An example of the adjustment that might be made for external obsolescence, and the reasons for it, is shown in Box 1 below. The figures used are illustrative only and do not relate to any particular industry.

Box 1

To determine if economic obsolescence is present, the assessor should review the economic indices or ratios of the subject property and the industry in which it competes as of the effective date of value.

The review should involve a comparison of the economic indices and ratios as of the effective date against those realized during a period when the subject

property and the industry in which it competes were performing as intended.

For publicly traded companies, the economic indices and ratios realized in the past ten years are readily available for review. The only way to obtain economic information that is applicable to the subject property is via the owner of the subject property.

Example

Year	Economic Ratio
2006	24
2007	22
2008	20
2009	20
2010	23
2011	19
2012	18
2013	15
2014	17
2015	17

The observations from the data contained in the table are as follows:

The peak ratio in the past 10 years is 24.

The mean ratio of the past 10 years is 19.5.

The mean ratio of the best 3 years is 23.

The ratio as of the effective date (i.e., January 1, 2016) is 17.

The assessor must compare the ratio realized as of the effective date (i.e., 17) to the ratio(s) realized when the industry or subject property was performing as intended.

If the assessor concludes that the mean ratio of the best three years (i.e., 23) reflects an era when the industry or subject property was performing as intended the allotment for economic obsolescence would be:

$$\text{EO} = \frac{\text{3 Year Mean} - \text{Ratio as of Effective Date}}$$

3 Year Mean

$$\text{EO} = \frac{23 - 17}{23}$$

23

$$\text{EO} = \frac{6}{23}$$

23

$$\text{EO} = 0.26 \text{ or } 26 \text{ percent}$$

The assessor should make best efforts to analyze many economic indices and ratios to obtain multiple indicators of economic obsolescence. Each of the indicators should be considered by the assessor before reaching a conclusion as to what the appropriate allotment for economic obsolescence should be.

Judgment

In some instances, obsolescence is easily recognized, but is difficult to quantify. Given a thorough understanding of the property, the nature and condition of its business, the nature and condition of the industry, sometimes the only available method of quantifying the obsolescence is through making a judgment. This judgment should be made with respect to current competitive standards and/or typical operating conditions for that type of property.

However, the determination of obsolescence should be based on facts and as many observations from the market as possible.

Once all forms of depreciation have been identified, quantified and deducted from reproduction cost new, the end result is the current value of the improvements determined through the use of the cost approach.

Adding in the net values of other improvements such as vehicle parking and the value of the land (see step 5 below) produces an estimate of value using the cost approach.

Table 5 shows an example of a typical ACS cost approach valuation summary (including the land value).

Table 5

Municipal Property Assessment Corporation		<small>©Copyright - All rights reserved Municipal Property Assessment Corporation Not to be reproduced by any means or distributed in any manner, in whole or in part, without prior written permission</small>	
<small>Roll Number: 37-39-020-240-02000</small>		PROPERTY DETAILS - PROPERTY VALUATION	
Market Value Base Year: 2008		Selected Valuation Method: ACS	
		Average Age:	
PROPERTY VALUE SUMMARY		VALUATION of BUILDINGS	
Total Bldg. Net Value:	\$17,992,604	Total Gross Floor Area (SF):	1,473,825
Total Yardwork Net Value:	\$391,715	Total Int. Finished Area (SF):	159,013
Total Land Value:	\$1,080,345	Total Bldg. RCN:	\$98,931,794
Property Total Value:	\$19,464,664	Functional Obsolescence:	\$38,895,225
Industrial MAF (Factor):	.00000000	Life Table Depreciation:	\$27,322,743
Commercial MAF (Factor):		Bldg. Net Value:	\$32,713,826
MAF Adjustment:	\$0	Economic Obsol. Percent:	45
Property Current Value:	\$19,464,664	Economic Obsolescence:	\$14,721,222
Property Current Val. Rounded:	\$19,464,000	Total Bldg. Net Value:	\$17,992,604
Property Value Override:		Total Bldg. Obsol. Percent:	54
Total Prop. Net Rate / SF GFA:	\$13.21	Bldg. RCN / SF GFA:	\$67.13
		Bldg. Net Rate / SF GFA:	\$12.21
APPORTIONMENTS		VALUATION of YARDWORK	
C T \$192,880	LT \$19,271,120	Total Yardwork RCN:	\$1,319,417.00
		Total Y/W Obsol.:	\$659,712.00
		Life Table Depreciation:	\$267,990
		Total Yardwork Net Value:	\$391,715
		EXCESS LAND	
		Land to Bldg. Ratio:	2.50
		Site Required:	
		Excess Land:	
		Excess Land Override:	
		Excess Land Value:	

5. Value the Land

At this stage of the valuation, the value of the land on which the pulp and paper mill has been developed needs to be considered. Land is valued using the market sales comparison process.

It is recognized that there may be very few sales of land to be used for pulp and paper mills in the immediate locality of the mill to be valued. For this reason, the assessor may need to look across a wider geographical area and/or look for sales of sites to be used for other large manufacturing plants.

Land Sales Analysis Process

The assessor should collect data on all land sales within the relevant time period in each region, tabulated by property type and zoning. Sales data collected includes:

- property address and legal description
- size of the lot
- infringements (wetlands, etc.)
- type of services to the site
- sales price
- date of transfer
- instrument number
- name and address of vendor and purchaser
- interest(s) transferred
- financing conditions
- zoning information

Sales data should also include improved properties that were bought and subsequently demolished in favour of a new development.

It is necessary to inspect the properties to determine if the sale was of a vacant parcel. Also, the nature of any new development on properties that have been re-developed should be noted.

Land Sales Analysis

More than any other factor, the type and quality of information gathered governs the quality of the final analysis.

Sales data on properties most similar to the subject property in terms of size, zoning, location and time of sale will have the most relevance to the valuation of land relating to the subject property.

Land sales should be verified with the vendor and purchaser to ensure that they are arms-length, open market transactions and that the cash equivalent value is discerned. Ideally, these sales should have taken place as close as possible to the date of valuation. Once comparable sales data has been obtained, land values should be established on the basis of a price per unit of site area.

Issues in the Valuation of Land

Some issues particular to valuation of land may arise as indicated below.

Sales Search Parameters – Location

Location is usually a critical factor for pulp and paper mills and is likely to reflect needs in terms of sources of supply (e.g., materials, labour, etc.), transport links, and customer base.

Principle of Consistent Use

The valuation of land is Methodology Guided by the principle of consistent use, i.e., building values should be complimentary and in accordance with the underlying premise used to value the land.

Sales Search Parameters

When searching for comparable land sales, the assessor should set up search criteria as follows:

- Properties with the same or similar zoning. When reviewing zoning for large industrial properties such as pulp and paper mills, the assessor should look to the uses allowed to ensure comparability.
- Properties of similar size. If there is an insufficient number of sales for properties of similar size, the assessor should attempt to cover a range of property sizes - some larger and some smaller - so that the value of the subject site can be interpolated from the data.
- Land within the same locality. The assessor should look first to sales of sites in close proximity to the subject. It may be necessary to expand the search area if an insufficient number of sales are found.

- Time of sale. Land values change over time, but given enough sales, or some paired sales (i.e., the same property selling more than once), it is possible to determine the change in land value over time.

Time of Sale and Size of Site

It is generally easier to adjust the sale price of land for time of sale and size of site as opposed to location and zoning. However, if an industrial operation such as a pulp and paper mill requires a site of substantial size, it is probably of greater assistance to consider similarly zoned and similarly sized sites located in a larger geographic area, rather than smaller sites located in the immediate vicinity.

Level of Services

The more services there are to a site, the higher its value, all other factors being equal. Sometimes, land sales reflect unserviced land prices (e.g., farmland, bush, etc.). It is challenging to establish the value of a serviced parcel when considering unserviced prices. However, by combining the cost of servicing (sometimes available from published municipal studies) with the unserviced price (plus time adjustment, plus developer's profit), it is possible to arrive at reasonable land value conclusions.

Land Value - Conclusion

The assessor will need to make judgements about the value of the land which has been developed for use as a pulp and paper mill based on whatever sales there may have been for broadly similar use.

Inevitably, the more specialized the use, the greater care has to be taken in the collection of data and the valuation of land.

Finalize Current Value

The final stage in this part of the process is to add the value of the land to the depreciated value of the improvements determined at step 4 to arrive at the overall current value of the pulp and paper mill as of the relevant valuation date.

6. Validate the Results

Checking the Results of the Cost Analysis

The final step in the cost approach is to review all the previous steps and ensure that the approach taken is justifiable, consistent and accurate.

In particular, the results of the breakdown approach to depreciation need to be checked for two issues:

1. That the value derived relates to the expected value of the property if it were to sell on the valuation date.
2. That the depreciation applied does not “double-count” the impact on value and, as a result, overstate the overall depreciation.

There are a number of steps that can be undertaken to confirm that the estimate of value completed by the cost approach is a “market” (i.e., current) value.

1. Complete an estimate of value using a market sales comparison approach.
2. Complete an estimate of value using an income approach.
3. Complete an age-life study.
4. Complete a market extraction depreciation study.
5. Where sales and other information is limited, check the value against the available sales information.

All these approaches require at least some information on real estate transactions (sales, rents, etc.). In markets such as large pulp and paper mills, the lack of such information makes this checking process challenging.

The assessor should look carefully to see if there are any transactions that can be found which may be of assistance in applying these validations.

The most straightforward forms of depreciation analysis that can be used to check the overall level of depreciation applied to derive the value of the improvements at pulp and paper mills are the “age-life approach” and the “market extraction method”.

Age-Life Approach

This approach seeks to establish the typical remaining value of the property at the end of its economic life (if any). For example, if a property sold for 5% of its value at the end of its 50 year economic life, then the total depreciation at the end of its life would be 95% and the depreciation to be applied to a 10 year old structure would be:

$$95\% \times 10 / 50 = 19.0\% \text{ depreciation}$$

The *Appraisal of Real Estate* (third Canadian edition) suggests that either reproduction costs or replacement cost could be used with the proviso that the basis for analysis should be internally consistent throughout the valuation.

The accuracy of the age-life methods rests on four conditions:

1. That the expected total economic life of the property can be established.
2. That the effective age and the expected remaining life of the property can be determined.
3. That a “straight-line” depreciation rate best reflects the depreciation occurring at the property.
4. That some further accommodations be made when the property is suffering from abnormal conditions.

Several issues arise in the application of the age-life approach:

- The calculation of expected life can be completed on the basis of chronological age or effective age, but not both. Effective age is a more refined measure, but it requires that the assessor know all the effective ages of the properties studied to create a life expectancy benchmark.
- The simple ratio adopted by the age-life approach describes a straight-line depreciation curve which is not a very sophisticated application of depreciation.
- The age-life method does not do well in predicting depreciation during abnormal economic times. The prediction of overall depreciation would be the same by using this method whether there was a recession or not.
- The age-life approach does best where properties have very similar functionality and comparable size, the effective ages are known, and there are no external obsolescence considerations.

The process requires some adjustment if the conditions are abnormal, or if the property itself is suffering from abnormal depreciation impacts.

The point of the analysis here is to determine whether the depreciation applied in total as a result of the breakdown analysis agrees with the factor arising from the age-life analysis. If there is a large discrepancy, then some further analysis of depreciation should be considered.

A simple example of how the age-life method may be used is shown in Table 6 below:

Table 6

Line Number	Subject Property Details	Formula	Amounts
1	Total economic life of improvements		55 years
2	Effective age of improvements		20 years
3	Age-life ratio	Line 2/Line 1	36%
4	Cost new of improvements		\$5,400,000
5	Depreciation amount	Line 4 x Line 3	\$1,944,000
6	Depreciated value of improvements	Line 4 – Line 5	\$3,456,000

In this example, the depreciated value of the improvements resulting from the application of the breakdown method applied at step 4 should be compared with the figure of \$3,456,000 derived from the age-life approach to see if it is broadly similar. If it is not, the assessor will need to review the calculation of depreciation to see if it contains any errors.

Market Extraction Method

An alternative approach to the calculation of overall depreciation is the market extraction method. Like the age-life approach, the method does not differentiate between the various types of depreciation, but uses available market sales data to establish the difference between costs new and market value.

The basis of market extraction is a study of the overall depreciation for a property type as set by the market. Knowing the value of a property as new, and the value and the age of the property when it sells, provides an indication of the overall depreciation.

The process requires sales of similar properties and establishes the improvement value at sale by subtracting the land value from the sale price. The difference between the cost new of the improvements (either replacement or reproduction) and the sale price is the total amount of

depreciation attributable to improvements. If the sales take place at different dates, then the typical global amount of depreciation per year can be calculated and applied to the subject.

A simple example of how the market extraction analysis works is shown in Table 7 below.

Table 7

	Sale 1	Sale 2	Sale 3
Sale price	\$1,900,000	\$2,370,000	\$1,880,000
Less land value	-\$1,234,000	-\$1,409,000	-\$934,000
Market value of improvements	666,000	961,000	946,000
Cost (new) of improvements	\$1,340,000	\$1,658,000	\$1,145,000
Total depreciation (\$)	\$674,000	\$697,000	\$199,000
Total depreciation (%)	50.3%	42.0%	17.4%
Age (years)	33	27	12
Depreciation per year	1.52%	1.55%	1.45%

From this study, the market extraction method concludes that the total amount of depreciation should be 1.51% per year. Given a 10 year old building at a pulp and paper mill, the total depreciation calculated from the market extraction method should be 15.1%.

By combining a number of such sales information for similar properties it becomes possible to build up a picture of the expected depreciation at a given age.

As a general approach, the market extraction method suffers the same kind of benchmarking issues as the age-life approach. With enough sales, it may be possible to develop overall depreciation curves for various sizes and types of large industrial properties. But the

application works best when comparable sales data of similar properties is available, and the results can be adjusted according to differences in the properties.

As already indicated, there may not be sufficient evidence of transactions concerning pulp and paper mills that will enable the assessor to use this method. However, whatever evidence is available should be examined carefully to see whether this type of analysis can be undertaken.

Sales Benchmarks

Another way to check a cost approach result is to find some sales of like properties and determine if the sales results of these properties show the same kind of results as the cost analysis on the subject, e.g., a similar \$ per square foot results. This is different from a “full-blown” market sales comparison analysis where the sales values are adjusted to produce a value conclusion for the subject.

This approach may be used where there is limited sales data or where the comparability between properties requires large adjustments. It is not designed to provide a valuation answer, but rather provide a point of comparison to show the assessor to determine whether the cost approach result for a pulp and paper mill is in line with the market evidence for other similar large industrial properties.

Comparison with other Pulp and Paper Mills

Having completed the valuation and carried out the validation checks outlined above, the assessor should compare the result with the current values of other pulp and paper mills within Ontario. If the result of the valuation process for the particular pulp and paper mill being valued appears to be out of line with the current values of other similar pulp and paper mills, the assessor should investigate the differences to see whether they indicate that an error may have been made at any of the earlier steps in the valuation.

Ideally, the outcome of the validation and comparison checks will show that the current value of the subject pulp and paper mill derived from the cost approach is correct.

For a simple example of what the completed valuation may look like, along with a reminder of the key steps in the valuation process, see Table 8 below.

Table 8

Reproduction cost new	\$1,400,000
Deduct excess capital costs (cost of overbuilt areas)	\$110,000
Replacement cost new	\$1,290,000
Deduct cost-to-cure deferred maintenance	\$30,000
Sub-total	\$1,260,000
Deduct physical depreciation - 30%	-\$378,000
Replacement cost new less depreciation (RCNLD)	\$882,000
Deduct additional functional obsolescence	-\$72,000
Sub- total	\$810,000
Deduct external obsolescence - 10%	-\$81,000
Depreciated value of improvements	\$729,000
Add land value	\$486,000
Market value estimate	\$1,215,000

Appendices

Appendix A -List of Properties Covered by this Methodology Guide

Company Name	Location Address 1	Location City	Roll Number	Total Floor Area
Resolute Forest Products	2001 Neebing Ave	Thunder Bay	5804-030-107-00100	2,796,174
Domtar Inc.	1 Duke St	Dryden	6026-260-005-14800	2,139,179
Domtar Inc.	1 Station Rd	Espanola	5226-000-001-05000	1,351,689
Resolute Forest Products	2 Allanburg Rd	Thorold	2731-000-018-04900	1,092,282
Tembec Inc.	1 Government Rd	Kapuskasing	5666-000-007-07600	1,077,530
Aditya Birla	21 Mill Rd	Terrace Bay	5854-000-001-00401	1,053,705
Irving Tissue Corporation	1 Clouston Ave	Toronto	1914-061-240-01200	666,339
Kruger, Krupack Pkg	10 Pedigree Crt	Brampton	2110-150-113-04500	603,771
Kimberly-Clark Inc.	570 Ravenscliffe Rd	Huntsville	4442-020-015-06200	518,819
Atlantic Packaging Products & Cascades Tissue Group	1900 Thickson Rd	Whitby	1809-040-030-03000	510,377
Hartman Canada Inc	58 Frank St	Brantford	2906-010-006-11000	437,269
Norampac Inc.	655 Creditstone Rd	Concord	1928-000-232-44450	398,689
Atlantic Packaging Products	333 Progress Ave	Toronto	1901-051-690-00400	370,209
Atlantic Packaging Products	195 Walker Dr	Brampton	2110-100-025-27700	328,994
Cascades Tissue Group	111 Progress Ave	Toronto	1901-043-570-00300	320,372
RockTenn Company of Canada	390 Woodlawn Rd W	Guelph	2308-040-017-18900	314,673
Norampac Inc.	450 Evans Ave	Etobicoke	1919-013-810-00200	307,325
Strathcona Paper LP	77 County Road 16	Napanee	1124-010-010-04800	303,278
MeadWestvaco Packaging Systems	281 Fairall St	Ajax	1805-030-007-20400	284,026
Norampac Inc.	300 Marmora St	Trenton	1204-010-025-60000	269,484
Dunn Paper	45 Merritt St	St Catharines	2629-010-004-02500	249,137
Cascades Boxboard Group	7830 Tranmere Dr	Mississauga	2105-050-115-18000	239,938

Norampac Inc.	7447 Bramalea Rd	Mississauga	2105-050-115-18000	238,833
Atlantic Packaging Products	5711 Atlantic Dr	Mississauga	2105-050-116-04710	208,604
Sonoco Canada Corporation	33 Park Ave E	Brantford	2906-040-008-28600	190,084
Atlantic Packaging Products	350 Midwest Rd	Toronto	1901-043-650-00800	187,261
Moore Packaging Corporation	191 John St	Barrie	4342-032-002-14400	186,909
Scapa North America	609 Barnet Blvd	Renfrew	4748-000-020-00601	185,883
Boehmer Box LP	120 Trillium Dr	Kitchener	3012-040-044-21000	183,557
Sonoco Canada Corporation	5 Bernard Long Rd	Trenton	1204-211-040-12800	140,495
Cascades Tissue Group	45 Milliken Blvd	Toronto	1901-113-101-01300	138,236
Sonoco Canada Corporation	5 Bernard Long Rd	Trenton	1204-211-040-12600	136,433

Note: Inventory listing is effective as of February 5, 2015. Listings continue to be reviewed and are subject to change throughout the consultation process.

Appendix B – Glossary of Terms

These definitions are from a variety of sources including Property Appraisal and Assessment Administration, Joseph Eckert, ed. IAAO and The Appraisal of Real Estate, Appraisal Institute, 12th Edition.

Accrued depreciation	The amount of depreciation from any and all sources that affects the value of the property in question.
Actual Age	Sometimes called “historical age” or “chronological age”. It is the number of years that has elapsed since building construction was completed.
Age/life method	A method of estimating accrued depreciation founded on the premise that, in the aggregate, a neat mathematical function can be used to infer accrued depreciation from the age of a property and its economic life.
Approaches to value	One or more of three approaches to value, namely (a) cost (b) sales comparison (c) income capitalization. The approaches employed will allow the assessor to determine the value of the property.
Assessment equity	The degree to which assessments bear a consistent relationship to market value.
Assessed value	Assessed value applies in ad valorem taxation and refers to the value of the property according to the tax rolls.
Breakdown method	A method for estimating total depreciation by specifying the amount of each kind of depreciation, often for each major building component, (including physical, functional and external).
Chronological age	The number of years elapsed since an original structure was built. Synonymous are <i>actual age</i> and <i>historical age</i> . Contrast with effective age.

Comparables, Comparable Sales	Recently sold properties that are similar in important respects to a property being appraised. The sale price and the physical, functional, and locational characteristics of each of the properties are compared to the property being appraised in order to arrive at an estimate of value. By extension, the term <i>comparables</i> is sometimes used to refer to properties with rent or income patterns comparable to the property being appraised.
Cost	The total dollar expenditure for an improvement (structure).
Cost Approach	Value as estimated as the current cost of reproducing or replacing the improvements (including the appropriate entrepreneurial incentive or profit) minus the loss in value from depreciation, plus land or site value.
Current value assessment (CVA)	As defined in the Assessment Act Section 1: Current value means, in relation to land, 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.
Deferred maintenance	Repairs and similar improvements that normally would have been made to a property but were not made to the property in question, thus increasing the amount of its depreciation.
Depreciation	The loss in value of an object, relative to its replacement cost, reproduction cost, or original cost whatever the cause of the loss in value. Depreciation is sometimes subdivided into three types: physical deterioration (wear and tear), functional obsolescence (sub-optimal design in light of current technologies or tastes), and economic obsolescence (poor location or radically diminished demand for the product).
Economic life	The period of time during which a given building or other improvement to a property is expected to contribute (positively) to the value of the total property. This period is typically shorter than the period during which the improvement could be left on the

	property, that is, its physical life.
Economic/External obsolescence	Loss in value to the improvements (relative to the cost of replacing the improvements with one of equal utility) that stems from factors external to the property.
Effective age	The typical age of a structure equivalent to the one in question with respect to its utility and condition. Knowing the effective age of an old rehabilitated structure of a building with substantial deferred maintenance is generally more informative than knowing its chronological age.
Equity	(1) The degree to which assessments bear a constant relationship to market value. Measures include the coefficient of dispersion and the coefficient of variation. (2) The net value of a property after liens and other charges have been subtracted. <i>See also</i> horizontal inequity and vertical inequity.
Fixed costs	Costs of fixed resources used by a firm that do not vary with production levels and cannot be changed in the short run.
Functional obsolescence	A flaw in the structure, materials or design that diminishes the function, utility and value of the improvement.
Functional utility	The ability of the property or building to be useful and to perform the function for which it is intended according to current market tastes and standards, the efficiency of building's use in terms of architectural style, design and layout, traffic patterns and size and type of buildings.
Highest and Best Use	The reasonably probable and legal use of vacant land on improved property that is physically possible, appropriately supported, and financially feasible that results in the highest value.
Long-lived items	Building components with an expected remaining economic life that is the same as the remaining economic life of the entire structure.

Marginal utility	The change in total utility to a customer that results from a one-unit change in the consumption level of an item.
Market extraction method	Method of estimating depreciation which relies on the availability of comparable sales from which depreciation can be extracted.
Market value	The most probable sale price of a property in terms of money in a competitive and open market, assuming that the buyer and seller are acting prudently and knowledgeably, allowing sufficient time for the sale, and assuming that the transaction is not affected by undue pressures. See Current Value Assessment
Obsolescence	One cause of depreciation, an impairment of desirability and usefulness caused by new inventions, changes in design, improved processes for production or external factors that make a property less desirable and valuable for continuing use. It may be either functional or external.
Remaining economic life	The number of years remaining in the economic life of a building or other improvement as of the date of the appraisal. This period is influenced by the attitudes of market participants and by market reactions to competitive properties on the market.
Replacement cost	The cost, including material, labour, and overhead, that would be incurred in constructing an improvement having the same utility to its owner as the improvement in question, without necessarily reproducing any particular characteristic of the property.
Reproduction costs	The cost, including material, labor, and overhead, that would be incurred in constructing an improvement having exactly the same characteristics as the improvements in question.
Short-lived items	A building component with an expected remaining economic life that is shorter than the remaining economic life of the entire structure.

Special purpose property	A limited market property with a unique physical design, special construction materials, or a layout that restricts its utility to the use for which it was built, also called special design property.
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