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Arboricultural Assessment

Tree Location:	Bunbury Street Footscray between Moreladl and Hyde Streets
Client:	City of Maribyrnong
Client Contact	David Keep | Coordinator Arboriculture | City of Maribyrnong
Inspection Date	Friday, 28 December 2018
Report Date	Monday 31 December 2018
Assessor	James Martens-Mullaly BaAppSc (Hon) Hort. (Arb) Qualified TRAQ Assessor.

1. Summary

1.1. Maturing Elm street trees located in Bunbury Street Footscray, a frequently used vehicular and pedestrian thoroughfare each have a history of early poor pruning that has resulted in the development of significant structural defects in primary supporting structures. Two large-scale tree failures have occurred in the past sixteen months and Maribyrnong Council has raised concerns over the potential for further large-scale failures. Nine trees were assessed and found to present a low or moderate risk of harm. Considering the recent failures, nature of the defects, and surrounding land use, active management is recommended. Practical management includes either significant crown reductions or implementing a planned tree removal and replacement strategy.

2. Scope and Method

2.1. Recent failure of a tree branch exposed significant internal decay of the trunk and primary support structures of a large Elm tree in Bunbury Street, Footscray, presenting a hazard in what is a commuter thoroughfare to the nearby Footscray train station, and comes roughly a year after an earlier large-scale tree failure from within the Bunbury Street road reserve.

2.2. Arbor Co was commissioned Maribyrnong City Council to assess the condition of nine street trees nominated by the client and located within the Bunbury Street road reserve and based on the findings suggest recommendations for future tree management.

2.3. A ground-based external inspection of each tree was undertaken, and details recorded. Observations of the environment were also recorded. A nylon faced mallet was used for percussion assessment of the trunks and primary branch attachments where accessible from the ground. The frequent use of Bunbury Street by vehicles and pedestrians was anecdotally inferred based on the author's visits to the street over the past seventeen years and its relative location to the nearby services and surrounding land use.

2.4. Interpretation of the risk presented by the trees relied on the principles established in the International Society of Arboriculture's (ISA's) Tree Risk Assessment method (TRAQ) which uses a qualitative process to identify, analyze and evaluate tree risk. An overview of the method is provided in Appendix 2.

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3. Observations

3.1. The subject trees are established Dutch Elm trees (*Ulmus* X *hollandia*), growing in the Bunbury Street road reserve located opposite property numbers 5, 9, 19, 29, 32, 34-36, 42, and 48. Tree assessment details are contained in table 1 below. The trees are elements of a more extensive mixed age tree planting comprising Elm (*Ulmus* sp.) and Ash (*Fraxinus* sp.); the oldest trees are likely to have been planted within the first decade of the twentieth century[1], the youngest, appear to have been planted within the past 12 months.

3.2. The trees are growing in nature strip that varies in width between ≈4m-5m. Bunbury Street is predominantly residential with some commercial premises. On-street parking is provided, and the street is used by pedestrians as a thoroughfare to a train station located at the west end of the street.

Tree ID	Property Address	Species	Age class	Tree Type	DBH (cm)	Height x Width (m)	Health	Struct'e	Comment
1	5 (east)	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	70	14x17	Fair	Poor	History of branch failure up to est. 600mm dia.. Recent branch failure in NW crown app. 150mm dia. at 9m above. Elongated and heavy end weighted branches in N and SW crown. Extensive cavities and decay of upper trunk and primary branches bases.
2	5 (west)	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	95	14x16	Fair to Poor	Poor	Decay of supporting structure. Open cavity on upper surface of southern primary branch trifurcation at 2.5m above grade. Obscured trunk buttress (likely level change). Reduced foliage density
3	9	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	99 @ 100	14x14	Fair	Poor	Past branch failure est. 500mm dia. with associated cavity extending into trunk. Extensive decay of N trunk face. Obscured trunk buttress (likely level change)
4	29	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	113	18x16	Fair to Poor	Poor	Recent failure of est. 600mm dia. primary limb revealing extensive decay atop trunk and extending into primary branches. Decay detected in lower N and W trunk.
5	32	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	69	14x14	Poor	Poor	Natural branch dieback - deadwood to 60mm dia. Extensive cavities and decay of primary branches supporting crown. Beehive in NE primary branch.
6	34-36 (east)	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	60	13x10	Poor	Poor	Natural branch dieback - deadwood to 60mm dia. Extensive cavities and decay of primary branches supporting crown of generally small branches being 150mm 250mm dia. Detected decay in SSE primary extends down trunk around 600mm
7	34-36 (west)	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	62	13x10	Poor	Poor	Natural branch dieback - deadwood to 60mm dia. Extensive cavities and of primary branches supporting crown; decay extending down N trunk face

[1] Bernard, J., Butler, G., Gilfedder, F and Vines, G., (2000) Maribyrnong Heritage Review Volume 6 Historic Places - Significant Trees in the City of Maribyrnong

Tree ID	Property Address	Species	Age class	Tree Type	DBH (cm)	Height x Width (m)	Health	Struct'e	Comment
8	42	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	96	13x12	Poor	Poor	Natural branch dieback - deadwood to 60mm dia. Extensive cavities and decay of trunk primary branches supporting crown. N primary branch, est. 500mm dia. with decay of upper surface of lower branch section. Extensive decay and cavity of SW primary branch with decay extending down trunk app.800m
9	48	*Ulmus* ? X *hollandica*	Mature	Exotic deciduous	107	18x16	Fair to Poor	Poor	Extensive decay detected in lower SE and N trunk. Widespread tip dieback. Cavity atop trunk in NE primary branch unions. Larges street tree to SW removed within 16 months prior exposing tree to altered wind loads.

Refer to Appendix 1 for explanation of descriptors

3.3. The trees appear to have been previously pollarded[2] at around 3.5m above grade though are now lapsed pollards[3] of several decades. The effect of repeated pollarding, creating numerous repeated wounds on the pollard scaffold (comprising primary branches) has contributed to decay, and formation of cavities in the pollard scaffold branching. In several of the assessed trees, cavities were found to extend well into the trunk i.e. Trees no. 1,3, 4, 6, 7, 8, and 9, while evidence of decay extending up into the branch regrowth was also noted, i.e. recent branch failure in Tree no. 4 located outside no. 29 Bunbury Street exposed a large cavity with decay observed extending into pollarded branches. Several specimens displayed branch failure wounds of up to ≈60cmØ.

3.4. All assessed trees displayed reduced vigour to varying levels, the worst included several trees displaying extensive dieback of natural branch ends and crown foliage comprising wholly epicormic regrowth (Trees 5, 6, 7, and 8 located outside no's 32-42 Bunbury Street). Evidence of possum browsing was widespread, and a negligible amount of Elm Leaf Beetle damage was observed throughout the trees, all of which have been treated for the control of the latter (pers. comm. D. Keep 29/12/2018).

4. Discussion

4.1. The subject trees are established specimens that have a history of early poor pruning which has contributed to the development significant structural defects and resulted in large scale structural failures in recent years. The trees are large specimens that overhang surrounding carriageway, pedestrian pavement and adjacent private allotments. Targets include vehicles, pedestrians (frequent site use) and buildings (permanent targets). The size of defects varied though in all trees; the parts most likely to fail for observation include the primary and secondary branches ranging in estimated diameter between 25cm to 60cm. Generally, no protection from falling parts was afforded potential targets. The risk of assessed defects failing within the next twenty-four months varied. Defects in Trees no. 1 4 and 8 are most likely to failure during normal weather, while defects observed in Trees 2, 3, 5, 6, 7, and 9 may be expected to fail in extreme weather conditions, but failure is unlikely during normal weather conditions. In all instances the consequences of falling tree parts impacting human targets was considered severe with serious personal

[2] A specialized pruning technique that establishes branches ending in a pollard head of buds and vigorous shoots and requiring regular repeating.
[3] A pollarded tree that is not re-pollarded so that the regrowth gets bigger indefinitely, developing high loadings on its typically

injury or death possible, while in relation to vehicles and buildings, moderate to high value damage could be expected.

4.2. In their current state, further large-scale structural failures is most likely in the short term. The location of the defects in the primary support structures is such that the defects cannot be removed.

4.3. Observed reduced vigour affecting foliage size / density, and defoliation, reduces branch weight and loading on the defects and may reduce failure potential in the short term, though comes at the cost of exacerbating existing health deficiencies, impeding the tree's ability to otherwise respond to the defects with adaptive growth. Improvements in tree health and / or the removal of possum browsing allowing dense foliage to develop cover can also be expected to exacerbate the defects and failure potential by increasing branch weight and loading on the defects. Improving tree health may improve adaptive growth responses, though given the apparent extent of the defects, it is not expected that adaptive growth alone will be sufficient to reduce the risk of defect failure in the longer term.

4.4. Presently, the removal of targets as a means of reducing the risk associated with tree part failure would seem impractical. Given the present ongoing decline in structural condition of assessed trees inaction may expose persons to risk unnecessarily. Practical options include either tree removal and replacement or severe crown reduction

4.5. Retaining the trees and managing the risk would require significant crown reduction and ongoing pruning to maintain reduced crown size (thereby reducing loading on the defects). Re-establishing the trees as pollards would provide as a practical means of crown size management. Initially pollarding can be visually unattractive, though would extend the useful life of the tree. Such management however would permanently reduce the ostensible amenity currently afforded by the large canopy, while ultimately the trees can be expected to continue to decline structurally. Pollarding is a management regime which requires a commitment to regular ongoing pruning and such a management approach warrants consideration of the cost benefit over the remaining functional lifespan of the trees.

4.6. Tree replacement would eliminate the risk of defect failure and allow a new crop of better quality specimens having a longer functional life span to be established. A tree removal and replacement strategy for Bunbury Street should consider the effect of staged removal and replacement on the potential exacerbate risk associated with retained trees and providing an environment facilitate healthy growth and desirable formative development of new trees.

4.7. Whether crown reduction or tree removal is undertaken, the effect of altered environment conditions on surrounding street trees requires consideration. Trees growing in close proximity are mutually interdependent for protection. Tree removal or significant crown reduction of trees exposes surrounding trees to altered environmental conditions such as increased light (encouraging foliage production) and increased wind loads. Should trees surrounding those pruned or removed be unable to acclimatize or are not adequately managed, an increase in the likelihood of large-scale structural failures in the latter may result.

indeterminate or defective union with the pre-existing framework

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5. Conclusion and Recommendations

5.1. This assessment has focused on the management of the trees based on their arboricultural condition, the risk posed by the trees to people and property and ability to manage trees to effectively reduce the risk presented by their defective structures. The assessment has not considered other values that may be applicable (i.e. envoirmental, cultural heritage) or the current policies and strategies guiding the management of street trees in Bunbury Street Footscray.

5.2. Assessed maturing Elm street trees located in Bunbury Street Footscray have a history of early poor pruning that has resulted in the development of significant structural defects in primary supporting structures. Two large-scale failures have occurred in the past sixteen months and evidence of a history of large-scale failures throughout the stand is evident from multiple branch failure wounds. Assessed trees were found to present a low or moderate risk of harm however, considering the recent failures, nature of the defects, and surrounding land use, if not addressed, risk will increase and active management is recommended. Practical management includes either significant crown reductions or implementing a planned tree removal and replacement strategy, both of which need to consider the potential implication of for surrounding trees.

5.3. The following management suggestions are offered for consideration:

I. Either

a) Preferably develop and implement a strategy within 12 months for managing the entire Bunbury Street tree population to avoid inadvertently increasing risk associated with structurally defective street trees **or**

b) In regard to the induvial assessed trees, implement the actions listed in Table 1 below either before or within the recommended timeframe and for all actions implemented assess the potential effects on surrounding trees and manage appropriately.

Table 1: Suggested individual tree management

Property Address	Tree ID	Work Actions	Timeframe (months)
5	1 (eastern tree)	Tree removal	12
5	2 (western tree)	Tree removal **or** re-pollard and possum banding / exclusion pruning	24
9	3	Tree removal **or** re-pollard and possum banding / exclusion pruning	24
29	4	Tree removal **or** re-pollard and possum banding / exclusion pruning	12
32	5	Tree removal	24
34-36	6 (eastern tree)	Tree removal **or** re-pollard and naturestrip soil improvement works and possum banding / exclusion pruning	24
34-36	7 (western tree)	Tree removal **or** re-pollard and naturestrip soil improvement works and possum banding / exclusion pruning	24
42	8	Tree removal **or** re-pollard and naturestrip soil improvement works and possum banding / exclusion pruning	12
48	9	Tree removal **or** re-pollard and possum banding / exclusion pruning.	24

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Appendix 1: Tree Assessment Descriptors

Note:

- Data collection is project dependant and may include some or all of the assessment descriptors listed below.
- Where collected data refers to a tree group, upper range measurements and average condition rating apply.

X & Y coordinates

Geographic coordinates for latitude (X) and longitude (Y) to locate tree position using the Geocentric Datum of Australia 1994 (GDA94).

Tree ID

Unique identifying number referred to in report and accompanying plans.

Botanical Name,

Tree name according to accepted international Code of Botanical Nomenclature.

Common Name

Common (vernacular) name applicable in south-east Australia.

Tree Type

Describes the general naturally occurring geographic origin of the species.

Descriptor	Definition
Indigenous	Occur naturally in the local environs.
Victorian native	Occurs naturally within Victoria (not exclusively) but within the study area.
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous.
Exotic	Occurs naturally in a country other than Australia.

Age Class

Describes the physiological stage of the tree's life cycle

Descriptor	Definition
Young	Sapling tree and/or recently planted, generally less than 5 years of age.
Semi-mature	Tree increasing in size, yet to achieve expected size in situation. Primary developmental stage.
Early-mature	Tree established, major structures – trunk, primary / secondary limbs developed, generally growing vigorously.
Mature	Specimen approaching expected size in situation, with reduced incremental growth.
Over-mature	Tree displays age-related whole organism senescence, characteristic can includes reduced growth, crown retrenchment, deterioration in plant part form and function.

Height and Width

Tree height and canopy width. Unless otherwise specified, measurements taken using a height meter; crown width is paced at widest axis.

Diameter at Breast Height (DBH)

Trunk diameter measured at 1.4m above ground level unless otherwise indicated. Multiple stems measured as per AS4970-2009. Unless otherwise specified measurements taken using foresters tape.

Diameter at Trunk Base (DTB)

Trunk diameter measured at the base of the trunk or main stem(s) immediately above the root buttress as per AS4970. Unless otherwise specified measurements taken using foresters tape.

Tree Protection Zone (TPZ)

An area around a tree set aside to provide adequate space for the preservation of root and crown to ensure tree viability inside which construction and worksite activity is controlled. The TPZ is calculated according to Australian Standard AS4970-2009 Protection of Trees on Development Sites where TPZ (radius) = Trunk diameter measured at 1.4m (nominal) above grade (DBH) x 12.

Structural Root Zone (SRZ)

The area around the base of a tree required for maintaining only tree stability in the ground and not tree health and viability (refer TPZ). The SRZ is calculated to Australian Standard AS4970-2009 where SRZ radius = (D × 50)0.42 × 0.64 where D = trunk diameter, in metres.

Health

Assesses various attributes to describe the overall vitality and vigour of the tree; may display one or more items from selected category.

Descriptor	Definition
Good	Above typical vigour and branch extension growth. Full canopy density. No nutritional deficiencies. No dieback. No obvious pest and or disease damage.
Fair	Minor reduction in vigour / branch extension growth. Negligible dieback, i.e. outer branchlets, isolated branch. Canopy density full to minor reduction i.e. .85%. Minor nutritional deficiencies. Minor pest or disease damage.
Fair to poor	Reduced vigour and branch extension growth (stunted). Reduced canopy density, eg 50-80%. Dieback present (extensive outer crown and / or include larger branches). Moderate nutritional deficiencies. Moderate pest or disease damage.
Poor	Extreme lack of vigour and branch extension growth (stunted to none). Reduced canopy density, eg <50%. Excessive, large and/or prominent amount & size of dieback. Severe nutritional deficiencies. Extreme pest and / or disease damage.
Dead	Tree show no obvious signs of vitality.

Structure

Assesses the principal components of tree structure based on non-invasive observations of external and above ground tree parts Tree may display one or more descriptors from a selected category.

Descriptor	Definition
Good	No obvious defect / damage to the roots, trunk or branches / branch attachment. Well-developed trunk and branch attachments. Branches well-formed spaced and tapered.
Fair	Minor defect / damage to the roots, trunk or branches / branch attachment. Adequately developed trunk, and branch attachments. Branches adequately formed spaced and tapered may contain some minor defects of primary / secondary branch attachments or more sever defects of smaller branches. Minor branch end-weight or elongation. Minor trunk / head lean. No history of chronic branch failure.
Fair to Poor	Moderate defect / damage to the roots, trunk or branches / branch attachment. Deficient branches form / spacing / taper. Moderate defects of primary / secondary branch attachments or more sever defects of smaller branches. Moderate branch end-weight or elongation. Moderate trunk / head lean. Branch failure evident.
Poor	Major defect / damage to the roots, trunk or branches / branch attachment. Defective branches form / spacing / taper. Major defects of primary / secondary branch attachments or more sever defects of smaller branches. Major branch end-weight or elongation. Major trunk / head lean. Major / history of branch failure evident.
Very Poor	Excessive defect / damage to the roots, trunk or branches / branch attachment – Tree or large section of tree has failed or failure imminent. Widespread defects of branches form / spacing / taper. Excessive defects of primary / secondary branch attachments or more sever defects of smaller branches. Excessive branch end-weight or elongation. Excessive trunk / head lean. History of chronic branch failure evident.

Arboricultural Rating

Categorizes the tree based on combination of tree condition factors and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics within the site / locale context.

Descriptor	Definition
High	Established tree of high quality / good example of species, provides high level amenity. Potential to be a medium- to long-term component of the landscape. Retention of these trees is highly desirable.
Moderate	Established tree of reasonable or better quality, providing amenity. Tree may have minor health / structural defect / deficiency that will respond to treatment. Tree has the potential to be a medium- to long-term component of the landscape. Retention tree is generally desirable.
Low	Established tree of poor quality and / or little amenity. Tree of poor health or structure generally beyond the benefit of treatment. Small and easily replace tree i.e. stem diameter below 15 cm. Tree is functionally inappropriate to specific location. Retention of tree may be considered if not requiring a disproportionate expenditure of resources.
None	Trees is dead, has failed, or failure imminent. Tree with short remaining life expectancy - less than 5 years - due to senescence. Tree has severe health and / or structural defects/ deficiencies beyond the benefit of practical treatments; loss of the tree would be expected in the short term. Tree infected with untreatable and virulent pathogen. Tree is severely dysfunctional to specific location. Tree is a recognised environmental woody weed with potential to spread in locale

Tree Significance
Trees have many values beyond arboriculture attributes. Recognition of one or more of the following criterion is designed to highlight other considerations that may influence the future management of such trees.

Significance	Description
Horticultural Value/ Rarity	Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure. Any tree of a species or variety that is rare.
Historic, Aboriginal Cultural or Heritage Value	Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic indigenous activities, including scar trees. Tree commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.
Ecological Value	Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant Indigenous vegetation that contribute to biological diversity

Useful Life Expectancy (ULE)
The estimated practical retention (in years) of an urban landscape tree based upon the considerations of tree amenity (health, structural integrity, and functional appropriateness.

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Appendix 2: ISA Tree Risk Assessment Method (Modified)

This assessment method is adapted from the International Society of Arboriculture (ISA) Tree Risk Assessment method and is intended to act as a guide for collecting and recording tree risk assessment information.

The ISA Tree Risk Assessment method is a qualitative risk assessment tool that has replaced numerical rankings with uses descriptive categories, such as “improbable,” “possible,” “probable,” and “imminent” for likelihood of failure using a series of decision matrices to determine the overall risk rating. The system has omitted numerical ranking to avoid confusion and the false sense of accuracy that was often experienced with previous qualitative, mathematical formulas.

Tree part—specify the branch, trunk, or root of concern.

Main concern / Conditions of concern—identify the concern(s) with the tree part listed. An example would be “large, dead branch over the house.”

Part size—a characterization of the part of the tree that may fail toward the target. Usually this is the diameter of the branch that can fall or the trunk diameter of the tree. It may be appropriate to indicate the size of the part that could impact the target.

Fall distance—if applicable, record the distance that the tree or tree part will fall before hitting a target; this may be relevant to the consequences of failure.

Target – identify the target people, or property, or activities that could be injured, damaged, or disrupted by a tree failure—within the striking distance (target zone) of the tree part concerned.

Target protection—note any significant factors that could protect the target because this may affect the likelihood of impact and/or the consequences of failure.

Tree risk has two components: (1) the likelihood of a tree failure striking a target, which is divided into the likelihood of failure and the likelihood of impact, (Matrix 1) and (2) the consequences of failure. Use your best judgment and the data available to assess the likelihood of failure (*improbable, possible, probable, imminent*) and the likelihood of impact (*very low, low, medium, high*). After these two decisions are made, use Matrix 1 for guidance on choosing the likelihood of failure and impact category (*unlikely, somewhat likely, likely, very likely*).

Matrix1: Likelihood matrix

Likelihood of Failure	**Likelihood of Impacting Target**			
	Very low - 1	**Low - 2**	**Medium - 3**	**High - 4**
Imminent - 4	Unlikely	Somewhat likely	Likely	Very likely
Probable - 3	Unlikely	Unlikely	Somewhat likely	Likely
Possible - 2	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable - 1	Unlikely	Unlikely	Unlikely	Unlikely

The likelihood of failure can be categorized using the following guidelines:

Improbable—the tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame.

Possible—failure could occur, but it is unlikely during normal weather conditions within the specified time frame.

Probable—failure may be expected under normal weather conditions within the specified time frame.

Imminent—failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for a risk assessor to encounter, and it may require immediate action to

protect people from harm.

Since these categories are time dependent, the time frame must be considered.

The **likelihood of impacting a target** can be categorized using the following guidelines:

Very low—the chance of the failed tree or branch impacting the specified target is remote. This is the case in a rarely used site fully exposed to the assessed tree or an occasionally used site that is partially protected by trees or structures. Examples include a rarely used trail or trail head in a rural area, or an occasionally used area that has some protection against being struck by the tree failure due to the presence of other trees between the tree being assessed and the targets.

Low—it is not likely that the failed tree or branch will impact the target. This is the case in an occasionally used area that is fully exposed to the assessed tree, a frequently used area that is partially exposed to the assessed tree, or a constant target that is well protected from the assessed tree. Examples include a little-used service road next to the assessed tree or a frequently used public street that has a street tree between the street and the assessed tree.

Medium—the failed tree or branch may or may not impact the target, with nearly equal likelihood. This is the case in a frequently used area that is fully exposed on one side to the assessed tree or a constantly occupied area that is partially protected from the assessed tree. Examples include a suburban street next to the assessed street tree or a house that is partially protected from the assessed tree by an intermediate tree.

High—The failed tree or branch will most likely impact the target. This is the case when a fixed target is fully exposed to the assessed tree or near a high-use road or walkway with an adjacent street tree.

The consequences of failure can be categorized using the following guidelines:

Negligible—low-value property damage or disruption that can be replaced or repaired, and do not involve personal injury.

Minor—low-to-moderate property damage or small disruptions to traffic or a communication utility.

Significant—property damage of moderate- to high- value, considerable disruption, or personal injury.

Severe—serious personal injury or death, damage to high-value property, or disruption of important activities.

Risk rating of part—the risk rating of the individual part for a specified target; the risk rating is categorized using Matrix 2: Risk rating matrix. Risk rating terms are *low, moderate, high, and extreme*.

Matrix 2: Risk rating matrix

Likelihood of Failure & Impact	**Consequences of Failure**			
	Negligible - 1	**Minor - 2**	**Significant - 3**	**Severe - 4**
Very likely - 4	Low	Moderate	High	Extreme
Likely - 3	Low	Moderate	High	High
Somewhat likely - 2	Low	Low	Moderate	Moderate
Unlikely - 1	Low	Low	Low	Low

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