Appendix B.3

Preliminary Maintenance and Storage Facility (MSF) Assessment Reports
HURONTARIO-MAIN LRT PROJECT
Preliminary Design/TPAP

Preliminary Maintenance and Storage Facility (MSF) Assessment Report
June 2014
508956-2222-40EM-0001

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BRAMPTON
Flower City

METROLINX

SNC-LAVALIN

steer davies gleave

DIALOG

LEAD
CLIENT: City of Mississauga/City of Brampton

PROJECT: Hurontario-Main St LRT Project Preliminary Design and TPAP

Prepared by: Jared Duivestein
Transportation EIT

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Deputy Project Manager
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Approved by: Chris McCarthy
Project Manager

REVISION INDEX

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EXECUTIVE SUMMARY

The selection of a preferred site for the Maintenance and Storage Facility (MSF) site for the Hurontario-Main Street LRT (HMLRT) project is a vital component of both the Preliminary Design and the Transit Project Assessment Process (TPAP) stages. A first stage preliminary high-level screening analysis (SLI, February 2012) was conducted on a total of sixteen candidate sites. This screening process eliminated twelve of the sites as having deficiencies that would rendering them infeasible for use (e.g. not being large enough). Four sites were short-listed as warranting further review. Following submission of the Draft MSF Site Assessment Report, the Client introduced a new requirement to protect for transit oriented development along the corridor by requiring a 100-metre setback along Hurontario Street for any MSF candidate sites. As a result of the new requirement, two of the shortlisted sites became ineligible. In response, the Client added three new sites for consideration, bringing the number of shortlisted sites to five. These are labelled as Sites 14, 15, 17, 18 and 19, as per their numbering from the screening process. The location of these sites is shown in Figure E.1. At Sites 14 and 19, two alternative configurations were proposed, each with their own set of benefits and drawbacks relative to the other configuration.

Figure E-1: Keyplan of Shortlisted Sites
This report encompasses the process and methodology by which further analysis was conducted on the five remaining sites considered environmental, technical, commercial and project implementation related issues and strategies, with the intent of identifying a Preferred Site to carry forward into the TPAP process.

Location

- **Operational Resiliency**: The degree to which the MSF and spur track leading to it are at risk of obstruction or failure which would prevent the entire system from operating. Segregated spur tracks are preferred in this regard.
- **Network Integration**: The MSF would also be able to act as a facility for other potential LRT lines that intersect the corridor. The distance from the intersecting lines to the spur track leading to the MSF should be minimized.

Capacity and Layout

- **Capacity and Layout**: All site areas are of a sufficient size to accommodate the MSF; this was one of the original screening criteria involved in the project. This criterion instead reflects the abundance and shape of the extent of land available at each site. The intent is that sites with a larger land area allow for more flexible layouts for the MSF, which can improve operational efficiency.

Land Use Compatibility

- **Existing Site Conditions**: The presence of existing uses or features (such as soil contamination) on the proposed site that would either make it undesirable for construction by negatively impacting cost and schedule.
- **Envisioned Future Land Use**: The degree to which the site could conceivably be purposed for other gainful uses or development that would no longer be able to be implemented should the MSF be constructed.
- **Compatibility with Neighbouring Uses**: A measure of whether an MSF on the proposed site would conflict with neighbouring sites. Examples of conflicting uses would include residential or environmentally sensitive areas.

Anticipated Costs

- **Property Cost**: The acquisition cost of the property on which the MSF is built. Lower acquisition costs are preferred.
- **Incremental Capital Costs**: all costs associated with the onsite construction of the MSF, beyond what would be required to provide a basic facility. This includes things such as structures, spur track, environmental remediation, expropriation and legal costs etc.
- **Incremental Operating Costs**: This encompasses two main effects. The first is the influence of the location of the site on fleet deployment and retirement both at the beginning and end of the day as well as service changes over the course of the day. Central site locations are preferred in this regard. Second is the additional operating
costs associated with running vehicles along the spur track. Shorter spur tracks are preferred.

**Potential for Phased Implementation**

- *Phasing Flexibility:* The degree to which the location of the MSF allows for a variety of phasing options in building the first portion of the line, should it be implemented in phases. Greater flexibility is preferred.

**Deliverability**

- *Ease of Obtaining Site:* The degree to which a site is likely to be able to be delivered for use as an MSF. A site with public ownership is preferred, as it allows for greater certainty regarding future development.
- *Environmental Requirements:* The need for supplementary permitting or other environmental considerations in order to construct and deliver the MSF facility, which could impact both cost and schedule.

Each of the seven site/configuration alternatives was evaluated based on their ability to meet these criteria. The Multiple Account Evaluation (MAE) scoring system and results are summarized in Tables E-1 and E-2, respectively.

### Table E-1: MAE Scoring System

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<tr>
<th>Value</th>
<th>Anticipated Performance Relative to Current Condition</th>
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Table E-2: MAE for candidate MSF Sites

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<th>Criteria</th>
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<th>Site 14 – C1</th>
<th>Site 14 – C2</th>
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<th>Site 17</th>
<th>Site 18</th>
<th>Site 19 – C1</th>
<th>Site 19 – C2</th>
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*Based on the PSLUP, Site 14 could possibly be obtained at no cost from the province (see Section 3.4 for further details).*
This scoring is intended to provide a guide by which the different alternatives can be evaluated; it is not by itself a recommendation. The conclusions and recommendations based on the scoring are discussed below. Section 8 of the report provides a more detailed breakdown of the assessment process for each site.

Findings and Conclusions

- Site 14 (East of Hurontario, south of Highway 407) is identified as the Preferred Site for the MSF for the purpose of conducting the TPAP; Configuration 1 for this site is shown in Figure E-2. The major reasons for supporting this site were that the property is potentially acquirable at no cost (making it the overall cheapest site in this case), and that the site is in a protected corridor and would be unlikely to otherwise have any major development on it; thus there is no opportunity cost of building on this site.

- Two other candidate sites (Site 17, Hurontario and Highway 401; and Site 18, Matheson and Avebury) have been flagged as ‘Do Not Preclude’. Both of these sites have the potential to become the Preferred Site in future, but at the time of analysis, each site was encumbered by one or more issues that negatively influenced their selection, which may or may not continue to be an issue as the project unfolds.

- Sites 15 (west of Hurontario and south of Highway 407) and 19 (Burnhamthorpe and Mavis, SW or SE corners) scored as the least favoured option and should not be considered further.
Figure 3-1: Site 14 Configuration 1
Next Steps

Site 14 has two proposed yard locations. The current base case locates the yard at the east end of the site, which preserves MTO’s current plans for a Bus Rapid Transit (BRT) stop within the Parkway Belt West TransitWay and a commuter parking lot. The MTO has however expressed conditional support for relocating certain elements of their TransitWay infrastructure (specifically the parking lots; the alignment of the TransitWay itself cannot be moved) if equivalent performance can be provided by an alternative configuration. Moving forward, the Project Team will examine opportunities to locate the MSF yard west of Etobicoke Creek and closer to the TransitWay facility in a manner that is acceptable to MTO. This has the potential to further reduce costs associated with construction and operation of a lengthy spur track.
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1.0 Introduction

This report, in its second version, is hereby submitted in agreement with the Work Breakdown Structure (WBS) code 2.2.2.2 for the Hurontario-Main Street LRT (HMLRT) Preliminary Design and Transit Project Assessment Process (TPAP) project. In the first version, entitled Draft Preliminary Maintenance and Storage Facility (MSF) Assessment Report dated April 13, 2012, an assessment was undertaken of the preferred site as identified in the Hurontario-Main Street Corridor Master Plan Report. It noted several strengths and weaknesses of the site in question, and determined that additional sites should also be considered as potential alternative locations.

On that basis, a high-level screening analysis was conducted for 16 potential MSF sites along the LRT line. Each of these sites were either rejected outright on the basis of not meeting the key site criteria feature (such as being too small for an MSF), or identified as warranting further and more detailed review. The majority of these sites had previously been outlined in Appendix 3D of the Hurontario-Main Street Corridor Master Plan dating from 2010, however two more candidate sites were identified by both the client and consultant project team during the high-level screening, bringing the total to 16 sites. Of these, four were shortlisted by the project team as warranting further review.

The four sites recommended in the draft assessment report were:

- Site 6 – Between Britannia Road and Highway 401, east of Hurontario Street
- Site 11 – Hurontario Street and Skyway Drive/Superior Boulevard, northwest corner
- Site 14 – Hurontario Street and Hydro One Corridor/Highway 407, southeast corner (Master Plan recommendation)
- Site 15 – Hurontario Street and Highway 407, southwest corner

The numbering of the sites is carried on from the Master Plan report.

The draft assessment was then issued to the client team for review, and the comments received served as input to develop this updated report.

The client provided feedback in terms of an additional screening criterion to be applied to the short-listed sites, and suggested the addition of three more sites that had not previously been considered (either in the draft assessment report or in the Hurontario Main Street Master Plan Report) for screening and potentially short-listing.

Following submission of the Draft report, the City of Mississauga advised that a reserved frontage strip of 100m on both sides of Hurontario Street should be allowed to accommodate transit oriented development. Therefore, any MSF site would need to be set back more than this distance. Exceptions to this rule are granted in locations where there is no conceivable potential for major redevelopment of sites to more transit supportive uses. As a result of this additional screening criterion, Sites 6 and 11 were eliminated from consideration, as they would no longer have sufficient storage capacity once the designated
buffer area is applied. Sites 14 and 15 meet this requirement and have been carried forward for assessment.

As previously mentioned, the client also nominated the following three additional sites for consideration as part of their feedback:

- Site 17 – Hurontario Street and Highway 401, northwest corner
- Site 18 – Matheson Boulevard and Avebury Road, northwest corner
- Site 19 – Burnhamthorpe Road and Mavis Road, southwest or southeast corners

These additional sites are assessed in detail in this report, as they all pass the screening process used in the Draft Report, as well as the new 100m setback requirement.

Figure 1-1 shows the locations along the corridor of all sites that have been short-listed for a more detailed evaluation.
Figure 1-1: Maintenance and Storage Facility Sites Short-listed for Evaluation
These potential MSF sites are evaluated with respect to ability to meet six different criteria (each of which may have one or more measures) considered to be critical in the evaluation of MSF location alternatives:

- Location;
- Capacity and Layout;
- Land Use Compatibility;
- Anticipated Costs;
- Potential for Phased Implementation; and
- Deliverability

As will be discussed in Section 2.0 below, the foregoing criteria included consideration of the following applicable environmental elements:

- Impacts to Natural Heritage Features (aquatic and terrestrial ecosystems; hydrogeology; encounter of contaminated soil/groundwater);
- Impacts to Cultural Heritage Resources (potential encroachment on, displacement or alteration of built heritage features or archaeological resources); and
- Socio-economic impacts (noise/vibration; existing business operations).

As environmental issues potentially affect a multitude of the above criteria, it was felt that rather than having a specific “Environment” criterion, that these concerns should be integrated into all of the other criteria where appropriate, particularly the Land-Use Compatibility and Deliverability Sections. In order to provide the reader with an easy reference for environment-specific issues, Appendix A provides a summary of the assessment for all environmental elements for each of the sites.

The remainder of this report is broken down into three major components; Section 2 describes the evaluation criteria for each one of the above-listed factors, Sections 3 through 7 include the assessment for each alterative site, and Section 8 consists of a multiple account evaluation for the sites and a final recommendation on the preferred site.

At two of the Sites, 14 and 19, two alternative configurations have been proposed, as each of them have a specific benefit or drawback relative to the other, and it was desired that both alternatives be captured. Neither configuration, nor “the” configuration shown on Sites 15, 17 and 18 should be considered definitive; rather they are used to generate representative values for some of the criteria for evaluation purposes. Site specific design optimization will take place once a final site has been selected.

Finally, it should be noted that this analysis was undertaken in the absence of official survey information and was based on publicly available mapping.
2.0 Assessment Principles and Criteria

The six criteria identified as being relevant to the selection of a preferred MSF site are described below in terms of what would represent an ideal or “best-case” scenario; the candidate sites will be compared against these standards to assess the degree to which they can achieve these desired features.

2.1 Location

This criterion is based upon the need for the site to be well located along the LRT route, and encompasses two aspects. The first is the operational resiliency of the line in terms of being able to reliably build-up and scale-down service, and the second is the degree to which the facility is strategically placed to accommodate potential future LRT lines. Note that the influence of the site location on fleet deployment/retirement costs is considered as part of the anticipated costs criteria.

Operational Resiliency

Access between service track and the MSF and vice versa is facilitated via a spur line that connects the two. Spur lines have two important considerations; the length of track required, and the ability of the system to be resilient/redundant in the event of a failure or obstruction. The length of the spur line is largely a capital and operational cost concern, and is therefore discussed in the Anticipated Costs criteria; this section discusses spur track configuration(s) from an operational perspective.

It is imperative that the system be configured in order to avoid situations where a single point of failure could obstruct trains from moving between the MSF and the service track, and thus potentially prevent the launch of morning service. Two sources of failure are possible: a system-related failure (for example, a loss of traction power, or a mechanical breakdown of an LRV travelling on the spur track) and an external obstruction (such as an illegally parked vehicle on side running tracks or a vehicle collision at an intersection). As such, a fully redundant access-way between the service track and the MSF is required. This could either take the form of two separate single-tracks on different streets, or a double track on a single street, provided it is designed in such a manner that a vehicle collision would not likely obstruct both tracks.

To be fully redundant, both tracks will require signalling systems that allow for bi-directional operation on either track. Furthermore, in locations where the spur track is operating in a shared right of way with vehicular traffic, the requirement to allow for bi-directional operation implies that it may be necessary for the road to be closed to vehicles so that LRV movements between the depot and mainline can be facilitated without the risk of a head-on collision between vehicles and a train travelling against traffic flow. Such a scenario would require an ongoing agreement between the host and the system operator such that in the event of an obstruction, the operator would have authority to close the road(s) in question to vehicular traffic without having to obtain formal permission from the City each and every
time. The degree to which this results in disruption for vehicular traffic depends on both the particular site and the spur line routes that are chosen. However, disruptions can be reduced through the development of response plans for different failure/obstruction scenarios, in order for traffic can be re-directed effectively, and the disruption can be eliminated as soon as possible.

**Network Integration**

Network integration considers the ability of the MSF site to serve as a facility for not only the HMLRT, but also for other potential LRT lines to be developed in the future. At the current time, the study team is aware of proposals/concepts/visions for rapid transit along Lakeshore Boulevard, Dundas Street, the Highway 407 TransitWay and Queen Street, each of which could conceivably (but not necessarily) take the form of an LRT system. The ability of the proposed MSF to act as a primary storage and operations location or as a secondary storage location and accident management backup facility for vehicles from these lines will be assessed, mainly as a function of the geographic distance from these corridors to the MSF, where the closer the site is to one or more of the proposed lines, the better, as this will minimize deadhead requirements. It is recognized that other lines may be too short to support their own MSF facility; in such an event it is noted that all of the MSF sites can be used for any of the hypothetical lines (provided their design standards are compatible), it would simply require additional deadheading along the HMLRT for a far-away line from the MSF. Thus, the candidate sites will be evaluated based on their proximity to the hypothetical lines.

**2.2 Capacity and Layout**

This criterion relates to whether the proposed site is of sufficient size and configuration to achieve the required storage capacity and accommodate a geometric layout that is responsive to the types of functions expected at an MSF. In conjunction with land parcel size and configuration, potential impediments/constraints imposed by natural features (watercourses; sensitive vegetation communities or wildlife habitat; groundwater resources) or other physical attributes are also considered in terms of their effect on the site layout.

The size of the available site is an important element in the definition of the site suitability, and such a requirement must be determined after confirmation of fleet requirements. Preliminary planning work suggests that fleet requirements may be close to 50 30m-long vehicles. The exact site area requirement to accommodate a given fleet is dependent on the shape of the site itself, and thus it is difficult to specify precise site area requirements without undertaking at least some level of conceptual design for an MSF at a particular site. Nonetheless, a generic MSF design was developed to provide a rough estimate, and based on this, preliminary estimates suggest that approximately 6.8ha will be required to accommodate a 50-vehicle fleet and associated operations. As site size was one of the main screening criteria used to develop the short-list of sites in the first place, all sites have the minimum 6.8ha requirement.

However, having additional space available beyond this requirement is useful for several reasons:
• Large available land areas allow for flexibility in the design of the facility. As the size requirement of the facility is in part dependent on its shape, the ability to provide a variety of different layouts will allow for a more compact and efficient MSF layout, and possibly reduce the total area needed in the first place. Furthermore, flexibility in the shape of the site allows for the layout to be designed to provide efficient and flexible train marshalling movements through the yard (in terms of moving from storage to mainline, access to maintenance facilities, coupling and de-coupling trains etc., which can reduce operating costs)
• As corridor demand is anticipated to approach the capacity offered by this fleet size at around the 2030 horizon year, planning for facility expansion to accommodate a larger fleet size over the long term is considered prudent. In this regard it is identified that all the five sites that are the subject of this assessment have enough capacity to accommodate nearly 50% more vehicles than the initial fleet requirement.
• Additional space would also be required if LRVs from potential LRT lines along Queen Street, Highway 407 TransitWay, Dundas Street, Lakeshore Boulevard lines and/or a northern extension of the HMLRT are to be accommodated on site. All of these corridors have been identified as potential future rapid transit corridors, with LRT presumably being one of the candidate technologies that may be recommended.

On this basis, sites will be judged on both the amount of space they provide above and beyond the 6.8ha requirement, as well as how the additional space is laid out in terms of allowing for flexible MSF layouts.

2.3 Land Use Compatibility

The land use criterion has two separate components; one related to the MSF site itself, and another that relates to its surrounding environments.

Existing Site Conditions

The MSF-site-itself criteria are largely based on current and previous use of the land on which the site would be built, and addresses anticipated costs or risks from locating on that particular candidate site. It addresses two main issues:

• Is the site vacant, or would its implementation result in the demolition/displacement of, or other adverse effects on existing structures and business operations?
• Does the site appear to have a history of use that could lead to suspicion of soil contamination or would require a more detailed environmental assessment prior to construction of an MSF? This could potentially have an adverse impact on schedule and costs?

Envisioned Future Site Use

This category encompasses the degree to which an MSF conforms with planned or envisioned future land use for the site. The placement of an MSF on any particular location has an inherent opportunity cost that the land it sits on is no longer able to be used for
another purpose. In some cases, some sites maybe more valuable for other uses and this will be reflected though this measure.

**Compatibility with Neighbouring Uses**

In terms of the site within the context of the surrounding uses, two major questions are considered:

- Would the site (or the spur line leading to it) cause undue noise and disruption to an existing neighbourhood?
- Would using the candidate site for an MSF tie in well with the municipalities overall vision for land use and urban form within the area?

In light of the second objective, the planning team has specified that the MSF should be set back at least 100m from the LRT corridor, to allow for transit oriented development (TOD) to be maintained or promoted along the corridor, as per the recommendations and examples given in the Master Plan. Exceptions to this rule would be considered in instances/sites where it can be demonstrated that there is a strong reason to believe that the land fronting Hurontario-Main Street would not be conducive to this type of land use.

**2.4 Anticipated Costs**

Each MSF option will have a number of different costs associated with it; the cost of the land that it’s built on, the cost of constructing the facility itself, and on-going operational costs that are attributable specifically to the MSF site that is chosen.

**Property Cost**

The property cost reflects the land value of the site on which the MSF will be built. Some of the candidate sites are privately held, while others belong to either municipalities or provincial agencies. All sites are assumed to be priced at full market value, unless otherwise noted (e.g. there is a possibility that the land could be donated as “in kind” funding towards the project, or simply given outright). The area assumed to be purchased is intended to include both the area needed for the initial site, as well as the space needed for future expansion, in order to protect against the possibility of the land being otherwise occupied in the intervening time period, and therefore no longer available for use.

**Incremental Capital Costs**

This criterion captures the costs associated with individual sites *above and beyond* what a “typical” MSF facility would cost. Broadly speaking, with sufficient space to allow for flexible designs, the overall cost of the facility should not vary significantly from site to site. However, certain sites may have additional constraints which must be accommodated (such as other existing or proposed developments) which would serve to increase the cost of the line. The existence of most incremental capital costs occurs on a site-to-site, and may be significant at some times, and almost non-existent at others.

One incremental cost that applies to all sites however, is the spur track. The length of the connection between the mainline track (revenue track) along Hurontario-Main Streets (or
the downtown Mississauga box, in the case of Site 19) and the MSF is an important consideration in terms of both capital and operating costs. The shorter the required length of spur line track (non-revenue track), the better.

Spur track turnouts have also been assessed for conflicts with proposed station locations. In all cases, it was determined that no unavoidable conflicts exists. The sole exception is Site 15 has a minor conflict with a stop platform which can be easily solved by shifting it slightly to the north.

Note that all sites are generally very flat or slightly sloped and are not anticipated to require a significant amount of earthwork. The exception is Site 19, which will require earthworks associated with demolition and removal of the existing on-site structure.

Other incremental costs include issues related to relocation of existing businesses on site, demolition costs, legal costs or environmental remediation costs.

Costs related to geotechnical considerations and site servicing are excluded as the information required to account for them is not currently available, and will only be investigated for the preferred site.

**Incremental Operating Costs**

This criterion captures two separate effects that the location and layout of the MSF site will have on operating costs of the line once it begins operations.

The first item pertains to the deployment and retirement of trains at both the beginning and the end of the service day, as well as changes in service level throughout the day.

From an operational perspective, the MSF should be located fairly close to the central point of the entire corridor. This allows for shorter lead times for morning service deployment, non-peak service scale down, PM peak service ramp up and night-time service decommissioning, and so reduces labour costs associated with line operation, but still maintains a relatively consistent start-up/service-level change/shut-down time for the entire line, so that no segment has to wait noticeably longer than another for service changes.

It also may preclude the need for on-line storage, or even the construction of a car-barn at the far end of the line from the MSF, which have a variety of logistic, security and cost implications. Furthermore, the central location also minimizes the maximum distance that a disabled LRV would have to be towed to reach the MSF.

The presence of the downtown Mississauga box, as a mid-line loop complicate the effects of site location on deployment and retirement costs, as compared to having a more conventional “line” being serviced. As such, a spreadsheet model has been developed to estimate these costs based on a potential line operating scenario. A supplementary memorandum, entitled *Effect of MSF Site Selection on LRT Operating Costs* that details the estimation methodology for the costs that are provided in this report.

The second item relates to the requirement for dead-running along the spur track is also an ongoing cost that must be addressed. This cost is deliberately estimated separately to allow for quick comparisons of potential savings/cost increases as a function of spur track
alignment once the MSF progresses into the preliminary design stage. As a formal service plan has not been established, the distance of the spur track will be used as a proxy for the approximate cost of running a line along it. Additional spur track distance increases not only the capital, but also the operations and maintenance costs associated with installing the guideway, tracks, power supply, changes to road geometry, utility relocations, etc. This additional line distance brings no marginal benefits from its construction, since, unlike the mainline, it does not actually serve transit users in any manner that would improve mobility or accessibility outcomes in the region. Longer spur tracks will also result in additional dead-heading time, and wear and tear on the LRVs, further increasing labour and maintenance costs. Finally, in addition to cost considerations, longer tracks are simply inefficient for the operator from a scheduling perspective. As discussed in the Operational Resiliency Section, several different track lengths may be envisioned for each site, depending on the configuration of the spur track between the MSF and the mainline that is implemented in order to ensure reliable operations. Calculations for spur track running operational costs are also included in the previously mentioned supplementary memorandum.

Note that incremental operation costs associated with an inefficient yard design are reflected in the Capacity and Layout criterion, as they cannot be quantified without a site-specific design being undertaken for each individual candidate site.

Finally it should be noted that these costs have been calculated only for the complete LRT line; potential/issues associated with phasing the project is assessed separately in Section 2.7.

2.5 Potential for Phased Implementation

The fifth aspect on which the candidate sites are assessed is their potential to allow for phased implementation of the HMLRT line. Potential phasing strategies are expected to be more formally analyzed towards the end of the Preliminary Design & TPAP study. As such, this criteria is scored on the degree to which the site would be flexible in allowing a variety of different initial phases.

It should be further emphasizes that no site inherently precludes the any particular phasing option; rather some of them simply allow for slightly more flexibility in terms of the exact location of the terminus, and the amount of capital spending required for phase one of the project. Sites located centrally along the line thus tend to provide the most flexibility for hypothetical phasing options.

It is further acknowledge that the client has several requirements for phasing options, which may preclude certain initial-phase configurations from being examined. These considerations will be reflected in future discussions of project phasing.

2.6 Deliverability

The final criterion upon which the site is measured is its deliverability, which is intended to account for the likelihood that the site will actually be able to be used for an MSF, regardless of how attractive it is. This has two major factors; the ability to obtain rights to built on the site, and obtaining all required environmental approvals to use the site.
Ease of Purchasing/Obtaining Permission to use Site

This criterion assesses the candidate sites with regards to their current legal ownership, and the degree of difficulty that is anticipated in obtaining the site for use as an MSF. It encompasses both the risk of not being able to obtain development rights to the site, as well as uncertainties regarding future developments on the site that may influence both their desirability and their capital costs. Three different categories of ownership are considered:

- Public ownership by a proponent; meaning that either the City of Mississauga, City of Brampton, or any other public agency that may own the site and would potentially be strongly in favour of transferring the land, or otherwise providing it to the project team. This should not necessarily be viewed as “free” land however, but rather land where the existing owner would actively assist in making it available for purchase/use for the project team, including protecting it from future development that would be incompatible with the HMLRT. This is considered the most favourable scenario.

- Public ownership by an agency not involved in providing transportation services, such as Hydro One. The benefit of such a site is that such a site would generally be protected against future development, unless the agency already has its own set of plans for the site. Nonetheless, most of these plans would be known in advance, and steps could be taken to arrive at a mutually beneficial configuration that allows all parties to make use of the site for their desired functions. The only drawback from such a scenario is that if the site configuration amounted to being a zero-sum situation, and it was determined that a site could not accommodate both uses. In such an instance, the agency that owns the land would be extremely unlikely to transfer it for use by the HMLRT, and a different site would have to be found.

- Privately owned land is considered the least desirable, as it has the highest level of cost uncertainty, as well as further uncertainties associated with its ease of acquisition. Privately owned land cannot be reasonably expected to be protected against future development, unless it is purchased by the project proponent(s). The client has advised that there is presently no budget available to proactively purchase a site to protect it for future use. Thus, even sites that are available for use today may be developed prior to the initiation of the detailed design and construction of the HMLRT, and thus would take longer to purchase (possibly requiring expropriation), as well as additional costs associated with relocating existing businesses/residents/users of the site, which is both an additional cost as well as undesirable in its own right.

Environmental Requirements

This criterion assesses the candidate sites with regards to their degree of difficulty and schedule/time implications that are anticipated with obtaining all the necessary environmental requirements and approvals. Consideration was given to species at risk and their habitats which are protected under the Ontario Endangered Species Act (ESA), federal Species at Risk Act (SARA), Toronto and Region Conservation Authority (TRCA) work permit requirements under Ontario Regulation 166/06, and Credit Valley Conservation (CVC) work
permit for any construction near a watercourse within the CVC Regulated Area (Ontario Regulation 160/06).

The impact of remediation activities as a result of existing site contamination is also considered.

Sites which require additional Stage 1-2 Archaeological Assessments were identified as part of the Master Plan phase. The sites which retain archaeological potential would have schedule/time implications associated with the completion of additional works.
3.0 Site 14 – Hurontario and Hydro One Corridor/Highway 407, Southeast Corner

Site 14 is located on Ministry of Transportation of Ontario (MTO) property between the Highway 407 TransitWay (and Highway 407 itself) to the north, and a small utility corridor and a major Hydro One corridor to the south. This site was selected as the preferred MSF site in the Hurontario-Main Street Corridor Master Plan report. Two alternative configurations were prepared for this Site. Configuration 1 places the MSF towards the eastern end of the site, such that it avoids having any transit facilities cross Etobicoke Creek, except for a spur track to connect the yard to the mainline. It is shown in Figure 3-1. Configuration 2 (previously referred to as Site 14a), suggested by the City of Brampton, places the MSF relatively close to Hurontario Street, and is shown in Figure 3-2, and involves the proposed Highway 407 TransitWay be diverted south of the facility. Note that in both cases, the overlaid “sketch” of an MSF is not a design being specifically proposed for the location; rather, it is simply a generic design being used to provide a sense of scale with regard to how much land area is required for the initial phase, and as such, may end up being partially outside the boundaries of the “available” site area. Once a final site is selected, a site-specific design will be developed; the sample configurations are simply used to inform the parts of the evaluation that require some level of information regarding overall site layout in order to be evaluated. Each configuration is evaluated separately.
Figure 3-1: Site 14 Configuration 1
Figure 3-2: Site 14 Configuration 2 (suggested by City of Brampton).
3.1 Location

**Operational Resiliency**

For both Configurations 1 and 2, the spur line would be located on an entirely segregated off-street right-of-way (ROW) and, therefore, not be subject to potential obstructions from vehicular traffic (except at the turnouts where it meets the service track). As such, no traffic related impacts are anticipated. However, the spur line would still require double tracking to protect against system-related failures. Providing sufficient spacing for a double-tracked ROW is not anticipated to be a challenge at this location.

**Network Integration**

Site 14 is ideally suited for long-term conversion of the proposed Highway 407 TransitWay to LRT, as the guideway is directly adjacent to the MSF. It also could potentially accommodate vehicles from the potential Queen Street LRT, although as it would be near the western end of the Queen Street corridor, as well as over 5km south of the Queen Street line, it may not be able to efficiently act as the sole storage location for this line, unless it was deemed to be the only realistic place to store the LRVs. This would need to be confirmed through further study and development of LRT operating scenarios for such a line. Envisioned rapid transit along Dundas Street and Lakeshore Boulevard may also take the form of LRT; however, these corridors (especially Lakeshore) are considered to be too far away from this MSF site to make efficient use of it. Finally, should the HMLRT be extended northward, the site location would be (relatively) convenient for storing and maintaining LRVs at the new northern terminus upon startup.

3.2 Capacity and Layout

The proposed configurations are generally considered to be conducive to use as an MSF. Their simple, semi-rectangular shape is well suited for an efficient facility, and can mimic best practice from similar MSF facilities around the world. The overall dimensions of the site, at approximately 165m wide by as much as 750m long (if it were to stretch almost to Kennedy Road), provides an abundance of space; far more than is ever anticipated to be required for the MSF. At approximately 12.1ha and 14.0ha respectively, both configurations have more than enough capacity to accommodate any future expansion.

One potential source of concern with regards to this site is the presence of a tributary to Etobicoke Creek that traverses it in the north-south direction, approximately halfway along its length. This headwater tributary of Etobicoke Creek on site appears to be intermittent. The riparian zone is fairly narrow, although portions of it appear to be wetland habitat and there is a small ponded area in the centre of the reach, which would likely have standing water and provide habitat for birds and small mammals. Large portions of this tributary have been straightened in the downstream reaches, along with accompanying losses of riparian vegetation; for that reason, the remnant riparian vegetation in this reach is important overall for shading, allochthonous energy inputs, as well as providing habitat for small mammals and birds. This tributary likely supports fish habitat indirectly through baseflow contribution and input of allochthonous material to downstream fish habitats. From a terrestrial habitat perspective, most natural vegetation has been cleared for agricultural or other land uses. However, there is remnant natural vegetation associated
with the Etobicoke Creek tributary. This consists of trees and shrubs along the banks of the watercourse, as well as woody and herbaceous riparian vegetation. To minimize negative impacts on the function and character of this natural feature, the layout of built form and related physical infrastructure on the site, including LRT tracks, will need to accommodate appropriate setbacks from the creek, and have a properly designed crossing in the event that such a feature is required.

At this site, there may also be some long term reduction to groundwater discharge to the stream due to change to impermeable surface and diversion of rainwater runoff to the storm sewer system. The site-specific conceptual layout may also consider the opportunity to integrate, and orient, low impact development measures, such as stormwater management ponds, to minimize impacts on the creek and any other natural features and add visual interest. The layout will also need to address objectives related to the design and orientation of built form on the site, such as: appropriate setbacks from the street (100m minimum), incorporation of sustainable design measures; and appropriate quality and application of building materials. From a groundwater/surface water and natural environment perspective, placement of the main portions of the facility to the eastern portion of the Site 14 alternative, such that they do not directly overlie the creek and would require a less substantive creek crossing/enclosure could be considered during development of a site-specific conceptual layout to mitigate potential impacts to the tributary.

3.3 Land Use Compatibility

Existing Site Conditions

The lands occupied by Site 14 generally falls within the land use zones designated for Interurban transit or public open space and buffer area in the Parkway Belt West Plan (1978, as amended), excerpts of which can be found in Appendix B.

The main concern in terms of land use of the site itself lies in potential space conflicts with the proposed TransitWay route, as will be discussed below.

The site is not located on or adjacent to any known heritage properties. However, it retains archaeological potential and will require a Stage 1 and 2 Archaeological Assessment unless the assessments have been completed previously. There are no known or suspected contaminated site issues. The site has been subject to prior development.

Envisioned Future Site Use

The Highway 407 TransitWay is intended to run in a corridor along a portion of the site. The line will feature a stop at Hurontario Street, as well as a large park and ride (commuter parking lot) facility.

Both the HMLRT and the Highway 407 TransitWay are intended to serve as major transit lines of regional importance. As such, efficient passenger transfer between the two services should be considered to be of high importance. However, the current configuration of the MSF, the Highway 407 TransitWay and the Highway 407 stop on the HMLRT mainline near the eastbound on-ramp make this both a technically and jurisdictionally challenging configuration to construct. As such, an alternative TransitWay alignment was also
considered, with the crossing of Hurontario Street placed further south. As shown in Figures 3-1 and 3-2, Configuration 1 can accommodate the existing TransitWay alignment, as envisioned by the Ministry of Transportation of Ontario (MTO) plans. Configuration 2 would only accommodate the new one. Thus, Configuration 2 inherently necessitates that the conceptual design of the TransitWay be revised; this would require agreement from the project proponent (i.e. MTO). This particular concern is addressed as part of the Deliverability criteria (Section 3.6).

Otherwise, the site is designated as a corridor for transportation-related facilities and, therefore, would not be subject to future residential or commercial development. Thus, no opportunity costs are considered to exist from developing this land, provided an overall site configuration can be developed that accommodates both the required HMLRT and TransitWay facilities.

Compatibility With Neighbouring Uses

The lands surrounding Site 14 are predominantly occupied by or designated for transportation, hydro electric power transmission infrastructure and a utility corridor, as well as light industrial uses. This is in compliance with uses designated in the Parkway Belt West Plan. As such, the proposed site is deemed to be compatible with the existing and planned adjacent uses, and the 100m TOD buffer space is not considered to be applicable here.

The proximity to the hydro corridor and nearby sub-station benefits the site location, as reliable power supply is readily available. However, discussions will be needed with Hydro One to discuss the acceptability of an MSF in this location.

3.4 Anticipated Costs

Property Cost

Land on Site 14 is expected to cost approximately $3.75Million-$5Million per hectare, at “across the fence” rates; meaning that the market value of the land adjacent to the property in question sets the property value. The adjacent properties are considered to be prime industrial/commercial lands of high value due to their proximity to Highway 407.

However, the Parkway Belt West lands in question are administered by Infrastructure Ontario, and designated for use by a variety of provincial agencies and other users, under the Provincial Secondary Land Use Program (PSLUP). In the instance of the lands being envisioned for use as an MSF (including the spur track corridor), these are designated for use by MTO (for “Inter-Urban Transit”/407 TransitWay), utilities companies (for “Utility”), recreational authorities (for Public Open Space and Buffer Area”) and Hydro One (for “Electric Power Facility”). The land needed for the MSF site may be subject to the charging framework for provincially-owned lands required for municipal transit infrastructure, wherein:

- easement rights for IO/MTO-owned “Non-Transmission Corridors” (i.e., the lands designated for the 407 TransitWay, Utility or Public Open Space and Buffer Area uses) required for dedicated transit uses (including maintenance facilities and access to them) may be granted at no cost; and
• easements or licences for IO-owned “Transmission Corridors” (i.e., lands designated for Electric Power Facility use) required for dedicated transit uses may be granted at reduced rates (half of the regular Provincial Secondary Land Use rate).

The uncertainty as to whether this framework would be applied to an MSF facility stems from the fact that no consultation (let alone a formal agreement) have taken place with MTO. Therefore, for the MSF facility itself (exclusive of the spur track to the facility) two separate cost estimates are proposed. The first is on the basis that the foregoing framework would apply (lands required are Non-Transmission), and thus the site could be obtained at no cost. The second is under the assumption that the framework would not apply or an agreement could not be reached, in which case the property would cost in the range of $30Million - $40Million.

The spur track will also need to be constructed, which may require easements on land designated for Hydro One (Electric Power Facility) and utilities companies (Utility). The property easement rights agreement outlined in the second bullet above (i.e., land is available at a 50% of the PSLUP rate) would apply. The exact amount of land required for the spur track is not yet clear, as it depends on setback requirements dictated by Hydro One, but this is expected to be relatively minor compared to the overall land area required for the facility itself. Whether these discounts can be achieved is subject to negotiations with Infrastructure Ontario, which manages the property on behalf of MTO and Hydro One.

**Incremental Capital Costs**

For Configuration 1, access from the proposed MSF site to the HMLRT mainline can be developed under the hydro corridor, resulting in a spur line length of around 850m (see spur track access review below).

Although it would be preferable from a site assessment criteria point-of-view, straight-line connection from the MSF site to Hurontario Street is infeasible and/or undesirable for the following reasons:

• Hurontario Street and Highway 407 have an interchange immediately north of the Hydro One ROW (i.e., directly in line with the proposed MSF), which would require that the spur track cross the eastbound on-ramp, which is both an operational constraint and a safety hazard;
• Hurontario Street is on a bridge in order to pass over Highway 407, so there would be a significant grade change required;
• Currently, the proposed alignment of the Highway 407 TransitWay jogs south at Hurontario Street, and intersects the road as an underpass. This jog will require the LRT yard access track to cross the TransitWay;
• Currently, a TransitWay Station is planned at the location where such an intersection would be located; and therefore the alignment of the TransitWay would require revision to accommodate this.

**Spur Track Access Review (Configuration 1)**

In light of the constraints identified for a straight line connection, alternative alignments for spur track connection to the mainline for Configuration 1 were examined, as shown in
Both alternatives for a feasible connection from the MSF to the mainline will have to cross the hydro corridor and the utility corridor; this is not considered to be technically problematic, as there are several other locations along the line where hydro and utility corridors are crossed. However, as with these other corridors, special treatments and considerations may be required during both design and construction in these areas.

- **Spur Track Access Alternative 1:** Approach Hurontario Street from the nearest signalized intersection to the south; this would be Topflight Drive, which avoids both the operational and grade-related conflicts of the “straight-line” option. The Master Plan concept design included a turnout at the intersection, which presumably was intended to indicate that this was the preferred location of a spur line connection. The total length of the spur line would be around 1,100m, which is feasible, but highly undesirable, especially if a shorter connection can be provided. Once on the south side of the hydro corridor, the spur line would travel along a short section of Edwards Boulevard before turning west onto Topflight Drive and ultimately arriving at Hurontario Street. Edwards Boulevard and Topflight Drive are both relatively narrow side streets and would pose a challenge to the alignment in terms of turning radii at their intersection, unless land is acquired from adjacent properties. An advantage of this option is that it precludes the need to directly cross the Highway 407 TransitWay, eliminating a potential ongoing operational conflict. The buildings in this vicinity are largely 1-2 story office and light industrial uses. Although traffic is assumed to be fairly light, many of these buildings would likely require that commercial vehicle-access to their site be maintained during construction in order to facilitate goods movement. Therefore, a design that accommodates this need, while ensuring that LRVs can be efficiently moved between the yard and the mainline, is necessary. A cost of approximately $6.5 Million is expected for this spur line alternative.

- **Spur Track Access Alternative 2:** Approach Hurontario Street from a spur line aligned north of the access road to the GO Transit park and ride facility, or even under the hydro corridor itself. This option would significantly reduce the length of the spur line required to access the yard to around 850m. The terrain at this location is relatively flat, and the location is still far enough away from the Highway 407 on-ramp and off-ramps to avoid potential operational conflicts. It would involve installing a new traffic signal to allow for LRVs to cross the northbound traffic lane, which does have the potential to create additional vehicle delay. However, as LRV movements to and from the MSF would generally happen outside of peak hours (barring instances of a train failure), this is not necessarily a major issue. Depending on the exact configuration of the Highway 407 TransitWay, this alternative may also require an at-grade crossing of the TransitWay. A cost of approximately $5.1 Million is expected for this spur line alternative.

In light of the above considerations, **Spur Track Access Alternative 2** was deemed to have more merit than Alternative 1, and is assumed to be the option that will be implemented for this site during the evaluation of alternatives.

Configuration 1 would also require a new access road to be constructed from Kennedy Road, which is expected to cost in the range of $0.5 Million.
For Configuration 2, the spur track is comparatively simpler and shorter, at around 280m in length, and would cost $1.7Million. Additionally, an access road would also need to be constructed from Hurontario Street, which is expected to cost $0.8Million.

A final incremental cost for Configuration 1 is the need to cross the Etobicoke Creek tributary, either by spanning the creek with a bridge for any spur track crossing, or placing the creek in a culvert. From an environmental perspective, a crossing that does not alter the creek-bed, as well as one that leaves room for wildlife to pass beneath, is preferred. Such a structure is expected to cost in the range of $0.6Million.

**Incremental Operating Costs**

Site 14 is approximately three-quarters of the way to the north along the North-South route running from Port Credit to Downtown Brampton. Its location is significantly farther north than an ideal midpoint location; something that will detract from its appeal from an operational point of view. 30 year NPV incremental fleet deployment costs based on the site location are estimated to be approximately $18.9Million. This applies to both Configuration 1 and 2, since deployment costs only depend on the Site location.

Spur track operational costs for Configuration 1 are high ($1.7Million NPV), due to the length of track required. Configuration 2 will have significantly lower costs ($0.6Million NPV) as a result of its shorter distance.

Based on the above figures, the combined 30 year operational costs associated with Configuration 1 is $20.6Million. The corresponding value for Configuration 2 is $19.5Million.

**3.5 Potential for Phased Implementation**

This site is situated in a fairly northerly location along the line, and therefore does not have a high degree of flexibility for phasing options.

**3.6 Deliverability**

**Ease of Obtaining Site**

The land that the facility would be built on is owned and managed by the Province (owned by Hydro One and/or MTO and managed by Infrastructure Ontario, depending on the exact location of the facility and spur line).

Hydro One is a crown corporation owned by the Province of Ontario. As the site for the spur line would not necessarily be purchased outright, but rather simply “used” (i.e., the transmission lines would remain), meeting the safety concerns of Hydro One is considered to be the main obstacle here, although some form of monetary compensation is also anticipated. However, given that only a spur track (i.e., no fixed facilities) are being proposed in Hydro One’s area of jurisdiction, this is considered to be a moderate and manageable risk.

The main MSF site will be located on property owned by MTO, who have indicated they have no issue with its use for such a facility, provided it does not interfere with the Highway 407 TransitWay alignment and stop infrastructure. The configuration of access roads, transit
exchange and parking lot could be modified, however. Configuration 1 allows for the existing TransitWay alignment to be maintained, and is therefore an acceptable alternative which is not anticipated to meet further resistance from MTO. Hence, in Figure 3.1, the extent of the available land could be treated as inclusive of both the grey-hatched and green-hatched area, with the caveat that in addition to placing an MSF within this area, it must also accommodate any relocated roads, parking lots and transit exchange. Note that re-planning the MTO facilities is assumed to generate no incremental construction costs for the HMLRT; it is assumed the same infrastructure can be delivered for the same cost, and simply with a slightly different layout. Configuration 2, being defined as a configuration that requires a more southerly TransitWay alignment, necessitates a major realignment of the TransitWay, and is thus considered to be unacceptable to MTO, and would face challenges associated with negotiating with MTO in order to allow for a configuration where the alignment and the transit stop would be relocated.

Environmental Requirements

A significant portion of the habitat southwest of the intersection of Highway 407 and Kennedy Road is being farmed for crops. However, a tributary of Etobicoke Creek flows southeast through the centre of these cropped fields and contains several species of wildlife. The creek forms into a large pond which is surrounded by a cattail marsh and cultural thicket that provides breeding territories, food and travel corridors for wildlife. Breeding activities were observed from species such as American Robin, Yellow Warbler, Cedar Waxwing, Gray Catbird, Eastern Kingbird (*Tyrannus tyrannus*), Eastern Wood Pewee and Song Sparrow. Barn Swallows were feeding fledgling young. The large fields of crops adjacent to the tributary contained Spotted Sandpiper (*Actitis macularius*) with young, nesting Killdeer (*Charadrius vociferus*) and a colony of Savannah Sparrows (*Passerculus sandwichensis*) singing on territory. White-tailed Deer and Coyote tracks and trails, found alongside the creek tributary, indicated its use as a travel corridor.

Much of the habitat on the southeast side of Hurontario Street and Highway 407 was provided by cultural meadow. Barn Swallow, Northern Rough-winged Swallow (*Stelgidopteryx serripennis*), Northern Mockingbird (*Mimus polyglottos*), Orchard Oriole (*Icterus spurius*) and American Goldfinch (*Carduelis tristis*) foraged in these meadows and breeding birds, such as Savannah Sparrow and Song Sparrow called on territory. For the areas encompassed by both Configurations 1 and 2, breeding behaviour of adult Barn Swallows and fledgling was observed. Barn Swallows and its habitats are protected under the Ontario Endangered Species Act (ESA) and ranked as a threatened species provincially. Barn Swallows also have a strong site fidelity to a particular nesting area; however, no nests could be found within the vicinity of any potential areas of impact along all of Hurontario Street. It is expected that an ESA permit would be required for both site configurations.

Finally, the Eastern Wood Pewee (*Contopus virens*) was also observed on site. The status of the Eastern Wood Pewee under the Endangered Species Act will be reassessed by the Committee on the Status of Species at Risk in Ontario in January 2013. In the event that it is assessed as being Endangered or Threatened pursuant to Ontario Regulation 230/08, the species will receive individual and general habitat protection at the time of listing. More specifically, the species and its habitat would be protected under Sections 9(1) and 10(1) of
the Endangered Species Act, and any proposed works affecting the species or its habitat would also trigger an ESA permit requirement.

There are few, if any, hydrogeological or contaminated site related concerns associated with either site configuration, other than the previously noted potential to reduce groundwater discharge and surface water runoff contributions to what is already an ephemeral watercourse. If required, these concerns could be addressed, at least in part, by incorporating stormwater runoff and discharge management features into the site-specific design process.

Alteration of the watercourse and disruption of wooded, riparian habitat would be required for construction of the MSF. A work permit from the Toronto and Region Conservation Authority (TRCA) under Ontario Regulation 166/06 will be required for construction in any TRCA-regulated area near or associated with a watercourse.

No major soil remediation activities are anticipated.

4.0 Site 15 – Hurontario Street and Highway 407, Southwest Corner

This site is similar to Site 14 in terms of its location within the corridor, save that it is on the west side, rather than the east side, of Hurontario Street. It would be located immediately south of the Hydro One transformer station, as shown in Figure 4-1, and stretches from Hurontario Street to Fletcher’s Creek. A Hydro One corridor runs from approximately the top-centre to the bottom-right of the site, and road infrastructure is also proposed in the bottom-right corner. A single configuration is proposed, which generally uses the central and western portion of the site. The available area for the configuration is approximately 9 hectares, as shown by the hatching in the drawing. The “sketch” of the MSF used previously in Figures 3-1 and 3-2 is inappropriately shaped for this site, and thus a rough site-specific design has been provided. It illustrates that the proposed available site area, while unorthodoxly shaped (a result of both environmental and developmental concerns) is nonetheless able to accommodate such a facility. Figure 4-2 shows the planned developments (sites E2-119, E2-120, E2-121) in the area which is to be accommodated.
Figure 4-1: Schematic of Site 15
4.1 Location

Operational Resiliency

The sites spur tracks will be roughly evenly divided between a segregated on-street ROW and a fully segregated right of way. From Hurontario Street to the intersection of Vicksburgh Drive and Derrycrest Drive, it is assumed the tracks will be constructed in either the centre or to the north side of Vicksburgh Drive (the curb-to-curb width of approximately 17m should allow for both a guideway and travel lane). Subsequent to this, the tracks will enter the MSF property, and will be entirely separate from traffic.

Network Integration

The potential for network integration is functionally the same as that for Site 14, although the connection between the MSF and a hypothetical Highway 407 TransitWay LRT would probably be configured slightly differently in response to site-specific constraints.

4.2 Capacity and Layout

As shown in Figure 4-1 above, the proposed configuration for site features a relatively unorthodox layout, driven by two main factors:

- The inability to use several of the areas closer to Hurontario Street, as a result of planned developments on these sites (including both structures and road extensions) as well as a need to accommodate the 100m setback requirement
- The strong desire to avoid the tributary to Fletcher’s Creek, which would likely require similar crossing requirements to Site 14, if it was to be built over. Configuring the site in this manner avoids such an expense. The Creek is discussed further in Section 4.3 below.
Figure 4-2: Planned Developments at Site 15
At approximately 9.0 hectares, the site configuration is considered to have a sufficient capacity to accommodate both near-term and long-term fleet requirements – the design provides for a significant length of storage tracks. The layout also manages to avoid any construction directly under Hydro One transmission lines, other than placing embedded tracks within what will, by the time of construction, be an already-existing road.

4.3 Land Use Compatibility

Existing Site Conditions

The existing land has not been developed (there are no existing improvements on site), and is simply a greenfield lot. As such, no demolition or site contamination is reasonably anticipated, although potential for contamination would be confirmed through a Phase I Environmental Site Assessment for the preferred site.

This site is not located on or adjacent to any known heritage properties. It retains archaeological potential and will require a Stage 1 and 2 Archaeological Assessment unless the assessments have been completed previously. There are no known or suspected contaminated site issues. The site has not been subject to prior development.

Envisioned Future Site Use

The site is currently designated for residential uses, and will therefore likely be developed into a residential subdivision if it is not used for an MSF, and hence there will be some level of opportunity cost.

Compatibility With Neighbouring Uses

In terms of acceptability of the site relative to its surroundings from an anthropogenic perspective, an MSF land use is considered to be compatible. The 100m buffer requirement is considered is implicitly included as the sites within 100m of Hurontario already have development envisioned for them, and thus are not used. The exact nature of the proposed developments immediately on the three properties that are being accommodated are unknown, but are assumed to be compatible with an MSF.

A potential source of concern would be that the site is adjacent to Fletcher’s Creek. The small, headwater tributary of Fletchers Creek is an intermittent watercourse and does not appear to provide direct fish habitat, but does provide indirect fish habitat to downstream watercourses. This tributary likely supports fish habitat indirectly through baseflow contribution and input of allochthonous material to downstream fish habitats. With respect to terrestrial habitat, most natural vegetation has been cleared for agricultural or other land uses. However, there is remnant natural vegetation associated with drainage swales, as well as the tributary of Fletcher’s Creek. This consists of trees and shrubs along the banks of the watercourse, as well as woody and herbaceous riparian vegetation. Therefore, from a natural environment perspective, Site 15 is not recommended.
Large cultural meadows provide the dominant habitat features. Similar to the habitat on the southeast side of Hurontario Street, Barn Swallow, Northern Rough-winged Swallow (Stelgidopteryx serripennis), Northern Mockingbird (Mimus polyglottos), Orchard Oriole (Icterus spurius) and American Goldfinch (Carduelis tristis) foraged in these meadows and breeding birds, such as Savannah Sparrow and Song Sparrow called on territory. A small drain parallel to Hurontario Street had evidence of Coyote and White-tailed Deer travelling through this area. Small mammals, such as Northern Short-tailed Shrew (Blarina brevicauda) and Meadow Vole (Microtus pennsylvanicus) were also observed living in this area.

There are no hydrogeological issues other than the possible reduction of permeable surface that is currently grassed and the diversion of rainwater to a storm sewer system.

### 4.4 Anticipated Costs

**Property Cost**

Land on Site 15 is expected to cost approximately $3.75Million-$5Million per hectare at market rates. It is currently owned by a private developer, DeZen Homes, and it is assumed that they intend to develop it into a subdivision at some point in time. Based on a 9-hectare requirement (the layout necessitates that almost all the available land be bought), this would cost in the range of $33.75Million - $45Million.

Regrettably, despite a large empty area in the middle of the site, but different components of the facility cannot be moved closer together as they are driven by track geometry requirements.

**Incremental Capital Costs**

Based on the layout suggested above, the spur track is required to be approximately 475m long, and would cost about $4.8Million. As the spur tracks tributary to Fletcher’s creek is avoided, no crossing costs are anticipated. It is further assumed that the road extensions shown in the above plans will already have been constructed, and thus will not be part of the scope of the HMLRT, other than installing embedded spur tracks in them. For internal movement however, an access road is required to cross the creek tributary and travel under the storage tracks. The total cost for this is expected to be in the range of $4.4 Million.

**Incremental Operating Costs**

30 year PV incremental fleet deployment costs based on the site location are estimated to be approximately $18.9Million. This value is the same as Site 14, since the sites are essentially across the street from each other where they would connect to the mainline, and therefore have almost identical deployment characteristics.

The spur line for this option is relatively long (475m), and thus is considered to be fairly inefficient. It is expected to cost around $1.0Million NPV in operation costs.

Based on the above figures, the combined 30 year deployment and spur track running costs are estimated to be in the range of $19.9Million.
4.5 Potential for Phased Implementation

Given that the location along the corridor is essentially the same as for Site 14, the potential for phased implementation is the same as described in Section 3.5.

4.6 Deliverability

Ease of Obtaining Site

The land in question is owned by DeZen Homes, a private developer, who it is assumed intends to construct a residential subdivision on the land. Currently, no development has taken place, and costs would be limited to paying fair market value for the land as well as costs associated with the expropriation process (legal costs, lost profit etc.).

There is a significant risk however that the site would be developed prior to its procurement for the HMLRT project, in which case, it would also need to be cleared. This would add several further complications, including the need to purchase property from many individual owners rather than a single one, costs associated with demolishing the development, relocation costs for the affected residents, and the general undesirability of potentially expropriating property if other options are available.

Environmental Requirements

Alteration of the watercourse and disruption of wooded, riparian habitat would be required for construction of the MSF. A work permit will be required for any regulated area near or associated with a watercourse.

No major soil remediation activities are anticipated.
5.0 Site 17 – Hurontario Street and Highway 401 – Northwest Corner

This site is located on the northwest corner of Hurontario Street and Highway 401. Specifically, it is the area west of a hypothetical southerly extension of Kateson Drive, as shown in Figure 5-1. A single sample configuration is assessed for this site.
Figure 5-1: Schematic of Site 17

Extent of Potential MSF Site: 20.4 ha
5.1 Location

Operational Resiliency

The spur line would need to travel along mixed traffic streets in order to reach the MSF. The 250m length is achieved by running the line along Capston Drive. This could either be a double-tracked section if design configurations allow for it or a single track section, with an additional single track along Kateson Drive and Annagem Boulevard (a distance of 475m).

Network Integration

The site is not particularly close to any of the four potential future LRT lines, and therefore is not considered to be convenient sharing storage space with them. As such, it scores very low on network integration potential.

5.2 Capacity and Layout

The site has an abundance of space, far in excess of what is required for a 50-vehicle fleet of LRV’s, and thus space exists for additional vehicle storage for future fleet expansion and/or sharing with other lines, where practical (refer to Section 5.4 below).

5.3 Land Use Compatibility

Existing Site Conditions

With regard to the site itself, the property has already been graded, and is thought to be ready for redevelopment. The fact that the current owner has already graded the site for construction would tend to indicate that it does not require major environmental remediation, although potential for contamination would be confirmed through a Phase I Environmental Site Assessment of the preferred site.

This site is located on a property that is listed on the Mississauga Heritage Register (6250 Hurontario Street). The site appears to be disturbed by previous development and likely to have archaeological assessment previously completed. There are no known or suspected contaminated site issues. Due to the preparation for development, it is likely that investigations were completed to identify contaminated site issues (if any). Historical use as farmland makes it unlikely to have been subject to significant contamination.

There are no surface water or hydrogeological issues at this site. Since there are no watercourses or vegetation assemblages on or adjacent to this site, there are also no aquatic or terrestrial habitat constraints.
Envisioned Future Site Use

The site represents prime land for light industrial development due to its location immediately adjacent to the interchange between Hurontario Street and an expanded Highway 401. As such, the site has a high opportunity cost in terms of not being able to be used for this type of development.

Compatibility with Neighbouring Uses

With regard to the surrounding land uses, the site is located in an area that currently consists primarily of warehouses, which are considered to be a compatible adjacent land use. The location of the site also allows for the required 100m setback from Hurontario Street for TOD, as well as an additional ~150m of buffer space so that the development fronting Hurontario Street (e.g., high density commercial use) will not be directly adjacent to the MSF.

5.4 Anticipated Costs

Property Cost

Land on Site 17 is expected to cost approximately $3.75Million-$5Million per hectare, based on the market value of the land right beside it, which is of high value due to its proximity to the recently built interchange between Hurontario and the widened Highway 401. Based on a 8-hectare requirement (to protect for future expansion), this would cost in the range of $30Million - $40Million.

Incremental Capital Costs

Given that the site is already graded and appears to be prepped for development (as discussed above), the no exceptional difficulties or circumstances appear to be present at this project that would require major incremental increases in costs.

A spur line length of at least 250m from Hurontario Street would be required, assuming the MSF site was restricted to only the property west of Kateson Drive. The existing intersection of Hurontario Street and World Drive can be used as the location for the turnout, preventing the need for an additional signalized intersection to facilitate LRV movements. This is a considered to still be a fairly moderate distance, and would cost approximately $3.0Million. If the alternative route via Kateson and Annagem was used for a second single track, costs would increase to approximately $4.5Million.

Incremental Operating Costs

The location of this site is relatively central, which provides greater operational efficiency for this MSF location. NPV deployment and retirement costs associated with this location are estimated to be around $14.6Million.
As mentioned above, the spur length is moderately short, and is expected to have a cost of $0.5 Million NPV associated with it.

Based on the above figures, the combined 30 year deployment and spur track running costs are estimated to be in the range of $15.1 Million.

5.5 Potential for Phased Implementation

The site is located roughly in the middle of the corridor, and is therefore highly flexible in terms of the potential phasing strategies that can be accommodated.

5.6 Deliverability

Ease of Obtaining Site

The land is privately owned by Orlando Corporation, an industrial real estate developer. It is believed that they intend to build on the site once market conditions improve, and thus they are not “using” the site itself. It is therefore possible that the site could be purchased from the developer under a voluntary arrangement, and that no expropriation would be required. However, this would need to occur soon, as there is a continual risk that Orlando may decide the timing is right to develop the site. Once developed, the desirability of the site would drop significantly, and costs associated with obtaining it could also increase substantially. Given that the client has stated they have no funding available with which to procure an MSF site, this is a major source of concern for Site 17.

Environmental Requirements

The area is a large, open cultural meadow. Killdeer, Spotted Sandpiper, Savannah Sparrow and Barn Swallows foraged in this area. American Goldfinch and Mourning Dove were common. There were no obvious mammal tracks or trails through the area. No additional environmental permitting requirements are anticipated.

No major soil remediation activities are anticipated.
6.0  Site 18 – Matheson Boulevard and Avebury Road – Northwest Corner

This site is located slightly west of Hurontario Street, on what is currently designated as Park 317 within the City of Mississauga, as shown in Figure 6-1. A single configuration was developed for assessment, and largely uses the northern half of the site.
Figure 6-1: Schematic of Site 18
6.1 Location

Operational Resiliency

Two options exist for a redundant spur track. It could take the form of either a 460m double-track along Milverton Drive (if implemented properly), or a slightly longer route via Avebury Road and Aldridge Street, which would have a slightly longer distance of about 580m.

If the double track option is chosen, there are two different placements of the track within the roadway that could be implemented. The first is to use a shared ROW, and potentially require shutting vehicular access to the street during emergency conditions, as discussed previously. The second is to make use of the landscaped strip on the north side of Milverton in order to expand the roadway and implement a segregated double track. The base mapping available to the project team does not cover the entire length of the spur line, but the small section that it does cover (immediately adjacent to Hurontario Street) shows that about 5.5m of the landscaped area is municipal property. If this is the case all the way to Avebury Avenue, then the segregated spur line should be able to be built without any expropriation, simply by widening the road and narrowing the vehicle travel lanes (which are currently 6.5m wide) slightly. This would still leave space for a sidewalk to be constructed on the north side of the road, if desired.

The main advantage of this option is that it will provide slightly higher reliability in terms of vehicle deployment, and would not require the roadway to be shutdown at short term notice to run counter-flow LRV’s along a track shared with vehicle traffic. Several streetlights may need to be relocated, and driveways to private surface parking lots may need to be converted to a Right In/Right Out configuration, although all affected parking lots are also connected to other east-west streets (Matheson Boulevard or Aldridge Street). The main disadvantage of this option is that it would cost more than simply providing a dual-track on a shared ROW and simply shutting down the road to traffic in the event of an emergency.

The preferred access option in this case depends largely on whether the City would find it acceptable to allow Milverton Drive to be shut down temporarily on those rare occasions when there is either a system failure or vehicular obstruction that blocks either the inbound or outbound spur track.

All the options above discussed should by no means be understood as deal-breakers if not implemented.

Network Integration

Similar to Site 17, this site is not very close to any of the potential future LRT lines, and so is not considered to be desirable sharing storage space with them.

6.2 Capacity and Layout

The maximum site size is approximately 14 hectares, so there is abundant space; well in excess of the 6.8ha required for the storage of 50 LRVs, and an area of approximately 8ha as required for future expansion.
There is one source of concern for the site, which is Cooksville Creek that runs directly under the middle of the site in a culvert, presenting a potential challenge in terms of both site layout and environmental concerns. Cooksville Creek is an ephemeral grassed swale and provides indirect fish habitat only. This site appears to be maintained (i.e., mowed) on a regular basis and the mower drives directly over the grassed swale. Natural vegetation has been cleared from this site, and the majority of the property is groomed for open space uses. As the Cooksville Creek tributary is marginal and indirect fish habitat at best, and there are no significant impacts to natural vegetation, this site does not present major concerns from a fisheries or terrestrial habitat perspective.

The area is almost entirely mown grass with a small section of cultural meadow and provides minimal wildlife habitat. The only birds utilizing this site were American Goldfinch, Red-winged Blackbird and Song Sparrow. Barn Swallows were seen overhead but no nests were found. There were no obvious mammal tracks or trails through the area.

From a hydrogeological perspective, this site in its current condition would be the least preferred due to presence of a buried stream that is piped through the site, the likelihood of long term reduction to groundwater infiltration due to changes to impermeable surfaces (if this area will be developed in the long term regardless, then this point is moot) and diversion of rainwater runoff to storm sewer system.

The City of Mississauga is currently looking at using almost the entire site for a stormwater management facility, which may solve some of the issues related to the buried stream, but create a more complicated set of issues in terms of accommodating both the stormwater facility and the MSF. Initial consultations with the City of Mississauga suggest that accommodating both these facilities on the same site is indeed possible from a technical perspective by putting the stormwater pond underground, and thus does not necessarily impose significant capacity and layout constraints if both facilities are designed properly. However, undertaking this comes at a cost premium; this is discussed in Section 6.4.

6.3 Land Use Compatibility

Existing Site Conditions

The site is currently designated as a municipal park, but consists of an empty field/open space, with the exception of a small business fronting Avebury Road and Matheson Boulevard on the northwest corner. This site is not located on or adjacent to any known heritage properties.

The northern portion appears to retain archaeological potential and will require a Stage 1 and 2 Archaeological Assessment unless the assessments have been completed previously. The history of the site is unknown; as such, it is not clear to what degree environmental remediation is required. However, it is common in some urban areas for parks to have been developed with imported fill (sometimes contaminated) or on top of old contaminated sites (landfills etc.). Therefore, this property is considered the second most likely to be subject to potential contamination concerns. The existing building on the site is currently occupied by a data security company and is unlikely to be a potential significant contaminant source.
Envisioned Future Site Use

As discussed above, Site 18 is currently envisioned as a stormwater management facility. In the event that the facility is instead built at a different location, the land would presumably become available for other uses, if the MSF was also not built there. For example, the site could either be developed/landscaped into an actual park, as per its designation, or sold to a private entity for uses similar to many of the adjacent properties, such as light industrial or office space.

Compatibility with Neighbouring Uses

In terms of the surrounding area, much of it consists of warehouses/light industrial or parking lots, which are considered to be compatible land uses, as they are not noise sensitive during the day-time, and generally unoccupied at night.

6.4 Access to the Mainline

Property Costs

An estimate provided by the City of Mississauga suggests that purchasing the entire site would cost in the range of $27Million, or approximately $2Million per hectare; substantially cheaper than several of the other sites. Based on an 8 hectare requirement, approximately $16Million in land costs are anticipated. This assumes that the City of Mississauga would be willing to sub-divide the site, and sell only the portion that would actually be required for the MSF, despite having a stormwater facility under the entire site. If this does not provide to be the case, the site could potentially cost up to the original $27Million.

Incremental Capital Costs

As noted previously, the City of Mississauga is currently looking at using parts of the same site for a stormwater management facility. This proposed use is currently in the very early stages of study, and it is believed that both the MSF and the stormwater management facility could be accommodated on the same site if design co-ordination is implemented at an early stage. This is anticipated to cost $20Million for the option of burying the entire stormwater pond underground and building the MSF on top. Other options, such as building a deeper stormwater pond on half the site and using the other half for the MSF were found to be significantly more expensive (up to $80Million).

Access to the site can be achieved by constructing a spur line along Milverton Drive (shortest possible distance), which would be approximately 460m long. This is an undesirably long spur in relation to some of the other options under consideration, and would cost approximately $5.6Million. On the positive side, the intersection of Milverton Drive and Hurontario Street is already signalized, so a new signalized intersection would not be required. IF the alternative spur configuration was used, costs would increase to $6.4Million.
Incremental Operating Costs

This site is almost exactly in the middle of the line, which is advantageous from a fleet deployment and retirement perspective. As a result, NPV 30-year NPV costs associated with this site are expected to be approximately $11.2 Million.

The spur length, at 460m would cost approximately $0.9 Million NPV, and increasing to $1.0 Million for the two separate single tracks.

Based on the above figures, the combined 30 year deployment and spur track running costs are estimated to be in the range of $12.1 Million to $12.2 Million, depending on which spur track alternative is used.

6.5 Potential for Phased Implementation

This site is located almost exactly in the centre of the line, and thus, similar to Site 17, and is considered to be a highly flexible location for different phasing strategies.

6.6 Deliverability

Ease of Obtaining Site

This site is owned by the City of Mississauga, and is a designated municipal park, but will be converted to a stormwater management facility. Initial discussions with the City of Mississauga suggest that an inter-departmental agreement could be reached wherein the site could be used for both facilities, provided the HMLRT project contributes the incremental costs associated with this plan. Discussions so far with the project team for the stormwater facility have been productive, and suggest they are willing to modify their conceptual plans, provided incremental expenses are attributed to HMLRT. The main source of concern is neither technical feasibility nor relations with the relevant stakeholder, but rather design co-ordination and timing. The two projects would need to be very carefully integrated in terms of design, and given the differing timelines, jurisdictions and priorities; it is not clear whether this is realistically likely to occur.

Additionally, if the stormwater facility is built significantly before the HMLRT, there is still an up-front cost to accommodating the MSF, which would need to be covered by the project. At this stage of the project however, timelines, funding commitments and project delivery options have not been determined, and it is unclear who would pay the incremental expense initially if it was to be incurred before the project procurement process was underway.

Of lesser importance, it is worth noting that there may be concerns regarding the legal status of the property, as it would accommodate both a distinctly City of Mississauga facility and a set of transit infrastructure which could conceivably be owned and/or operated by another party.

Recent feedback from the City of Mississauga suggests that there is a possibility that the stormwater facility may be relocated to an underground facility at a nearby school instead. If such was the case, the most significant issue facing Site 18 would be averted, and the site would become significantly more deliverable (as well as have lower incremental capital.
costs). However, until such a move is confirmed, it is assumed that the stormwater facility will in fact be constructed on this site.

**Environmental Requirements**

At this point in time, no additional environmental requirements are anticipated for this site.
7.0 Site 19 – Burnhamthorpe Road and Mavis Road – Southwest or Southeast Corner

Site 19, is located on the south side of the intersection of Burnhamthorpe Road and Mavis Road, with opportunities to establish the MSF site on either the east or the west side of Mavis Road (designated as Configurations 1 and 2, respectively). The site, with both configurations, is shown in Figure 7-1.
Figure 7-1: Schematic of Site 19
7.1 Location

Operational Resiliency

The only realistic option for redundant spur lines for either configuration is to double-track along Burnhamthorpe, most other routes are excessively circuitous. This is not considered problematic however, as Burnhamthorpe is wide enough for a segregated double track guideway as per the current design from Hurontario Street to Living Arts Drive. As such, from a redundancy perspective, this is considered to be a fairly straightforward spur line to implement.

Network Integration

It may be possible to build in a “back-door” connection from a Dundas Street LRT along Mavis Road. However, this would still require a 1,500m spur line, and it also assumes that a future Dundas LRT would travel at least as far west as Mavis Road. Alternatively, a junction at Dundas Street and Hurontario Street could allow the Dundas LRT to have its trains travel along the HMLRT trackway in order to reach the site, although this would amount to almost a 4km section of deadhead distance, which is undesirable.

The other three potential future LRT lines are too far away to make convenient use of this maintenance facility.

7.2 Capacity and Layout

Overall, the site has a reasonably workable shape(s), with the total available area working out to around 16.7ha and 23.8ha for Configurations 1 and 2, respectively. As such, in either case, less than half of it should actually be needed. Depending on the exact legal configuration of the property parcels, it may be necessary to develop the layout of the MSF in a manner that minimizes the number properties that need to be purchased or is most conducive to the configuration of land that could be most readily acquired. For example, if certain property owners were willing to sell, but others were not, then the MSF layout may have to be adapted to accommodate this, unless the City implements the expropriation process in order to obtain the sites required for a more preferable layout.
7.3 Land Use Compatibility

Existing Site Conditions

The site is currently largely occupied by warehouse/industrial and retail/service uses, which would have to be demolished in order to make way for the MSF. Furthermore, there are manufacturing and chemical facilities at this location (particularly for Configuration 1), which represent a relatively high potential for exhibiting contamination and requiring environmental remediation, although the extent of this is unknown at this point.

There are no natural features at this location and no wildlife species were observed during the site visit. As there are no watercourses or vegetation assemblages on or adjacent to this site, there are no aquatic or terrestrial habitat constraints. There are also no hydrogeological issues for this site.

This site is not located on or adjacent to any known heritage properties and does not appear to retain archaeological potential. There are no natural features at this location and no wildlife species were observed during the site visit.

This is the least preferred of the options from a contaminated site perspective. There are multiple developments, particularly on the portion east of Mavis Road, some of which are commonly associated with contaminated sites, including an Imperial Oil gas station, a manufacturing facility (Nye Thermodynamics), a Concrete Plant (Innocon), a Bell Canada Maintenance Facility, an automotive parts dealership and garage (Colallillo Tires and Lube), as well as typical commercial uses. Fielding Chemical Technologies is also located in the southern portion of the plot, and, depending on the ultimate area required, may need to be included in the land assembly, or would be an adjacent neighbour. This business operation deals specifically with solvents, which are noted to be extraordinarily difficult contaminants to remediate.

As a result of the number of sites involved and their varied nature, it is likely that, at a minimum, costs on the order of hundreds of thousands of dollars would need to be spent on environmental investigations, as well as the Designated Substance Surveys that are required by the Ministry of Labour for each building prior to demolition activities.

Envisioned Future Site Use

The site is not foreseen as being especially likely to be subject to wholesale redevelopment in the near future, and in any case would likely continue to be subject to the same sorts of land uses. As such, the opportunity cost of developing the site is essentially considered to be the same as the opportunity cost of removing what is currently located on site; meaning a variety of industrial and service-related businesses.
### 7.4 Anticipated Costs

#### Property Costs

The land cost for the entire ~16.7 hectare area used in Configuration 1 is estimated to cost $85Million, or approximately ~$5.1Million per hectare, on par with the upper range estimates for Sites 14, 15 and 17. Assuming only 8 hectares of the site was required (and could be expropriated in a manner such that only the required amount of land is actually purchased), this would result in a range of $38 to $46Million in property costs. Configuration 2 would be expected to have similar costs.

#### Incremental Capital Costs

As the site is occupied, rather than a brown- or green-field, there are a multitude of additional costs that must be accounted for. Tenant relocation, business loss and costs associated with the expropriation cost are expected to reach an additional $55Million for the whole site, this is assumed to reduce to approximately $27Million for the option of the site envisioned for use.

The site contamination issue is a major risk in terms of cost escalation. A cost estimate for remediation cannot easily be estimated without a more detailed investigation, but experience on previous projects suggests that these costs can be substantial.

The need to demolish all buildings on the site also presents an additional cost compared to most other sites along the line.

For Configuration 1, A spur line of approximately 750m, at a minimum, would be required in order to reach Grand Park Drive and Burnhamthorpe Road, the nearest possible connection point from the MSF yard to the revenue track. This would cost approximately $9.2Million. In the case of Configuration 2, the spur track would need to extend to the west side of Mavis Road was selected instead; this would increase to 1,050m, a cost instance of $12.9Million. Both distances, for simplicity, assume that the Downtown Mississauga Box will be routed along Living Arts Drive, although a number of LRT routing options are still being examined in the Downtown.

#### Incremental Operating Costs

Deployment and operating costs for this site are comparatively low. This is because the spur track is located close to a proposed terminus, and for midday service changes, operating vehicle sets can go out of service at the nearest LRT stop, and then immediately research the spur track, with negligible deadheading. As a result, 30-year NPV costs are estimated to be $6.9Million for this site.

The spur track for Configuration 1 this site is considered to be extremely long just to reach the service track, and will cost $1.5Million NPV. Configuration 2 is even longer and more expensive, at $2.1Million NPV.
Based on the above figures, the combined 30 year operational costs associated with Configuration 1 is $8.4 Million. The corresponding value for Configuration 2 is $9.0 Million.

**Compatibility with Neighbouring Uses**

The site is bordered on three sides by residential uses, which may raise concerns regarding noise, particularly late at night, during vehicle cleaning, maintenance and other yard operations. The site on the west side of Mavis Road is slightly better, as it only would have residential uses to the north.

7.5 Potential for Phased Implementation

The site is relatively southerly along the line, and therefore may have trouble being flexible enough to accommodate certain phasing options.

7.6 Deliverability

**Ease of Obtaining Site**

Given the land use, the site is in all likelihood privately owned, either by the businesses occupying the site, or by a land owner leasing the location to them. As the site is well used right now, it is anticipated that there may be some reluctance on the part of the businesses and/or the land owners to relocate so it can be used as an MSF site. This could potentially result in the need to expropriate the site, which should be considered an avenue of last resort. Site 19 is considered both difficult and undesirable to obtain.

**Environmental Requirements**

At this point in time, no additional environmental requirements, beyond the aforementioned site remediation, are anticipated for this site.
8.0 Multiple Account Evaluation (MAE) of Alternative Sites

A total of five sites and seven configurations were described above, and considered as potential alternatives for the Hurontario-Main LRT Maintenance and Storage Facility. Each site was assessed with regard to its ability to meet six criteria considered to be important in determining a preferred site.

A Multiple Account Evaluation (MAE) scoring framework is used below to act as a guide and assist in the selection of a preferred site. It is not intended to be a “scoring” system wherein the site with the highest net value “wins”, but rather simply concisely summarize the relative advantages and disadvantages of each site. Quantifiable costs (i.e. direct financial costs) are summarised directly, while all other aspects are scored qualitatively. The reader is reminded that these costs do NOT include the base cost of the MSF facility itself, which is expected to be in the $40Million - $60Million range; the table simply shows the incurred costs above and beyond the base cost. Note that Site 19 only includes a lower bound value, as this estimate excludes environmental costs altogether as not enough information is available to conduct a proper estimate, however they are expected to be substantial.

The preferred site from the Master Plan (Site 14 Configuration 1) is taken to be the Base Case, and all other sites are assessed relative to it. Table 8-1 summarizes the MAE scoring levels, and Table 8-2 shows the qualitative scoring for each criterion for each site. A more detailed scoring summary can be found in Appendix C.

Table 8-1: MAE Scoring System

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<tr>
<th>Value</th>
<th>Anticipated Performance Relative to Current Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>🍑</td>
<td>Significantly Better</td>
</tr>
<tr>
<td>🍑🍇</td>
<td>Considerably Better</td>
</tr>
<tr>
<td>🍑🍇🍇</td>
<td>Slightly Better</td>
</tr>
<tr>
<td>🍑_HALF</td>
<td>No Better or Worse Than Base Case (Site 14 – C1)</td>
</tr>
<tr>
<td>🍑🍇🍇compareTo</td>
<td>Slightly Worse</td>
</tr>
<tr>
<td>🍑🍇</td>
<td>Considerably Worse</td>
</tr>
<tr>
<td>🍑</td>
<td>Significantly Worse</td>
</tr>
</tbody>
</table>
Table 8-2: MAE for candidate MSF Sites

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Measure</th>
<th>Site 14 - C1</th>
<th>Site 14 - C2</th>
<th>Site 15</th>
<th>Site 17</th>
<th>Site 18</th>
<th>Site 19 - C1</th>
<th>Site 19 - C2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Resiliency</td>
<td></td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Network Integration</td>
<td></td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Capacity and Layout</td>
<td>Capacity and Layout</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Land Use Compatibility</td>
<td>Existing Site Conditions</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Envisioned Future Land Use</td>
<td></td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Compatibility with Neighbouring Uses</td>
<td></td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Anticipated Costs</td>
<td>Property Cost ($Million)</td>
<td>0* (or 30-40)</td>
<td>0* (or 30-40)</td>
<td>34-45</td>
<td>30-40</td>
<td>16-57</td>
<td>38-46</td>
<td>38-46</td>
</tr>
<tr>
<td></td>
<td>Incremental Capital Costs ($Million)</td>
<td>6.2</td>
<td>2.5</td>
<td>9.2</td>
<td>3.0</td>
<td>25.6-26.4</td>
<td>&gt;36.2</td>
<td>&gt;39.9</td>
</tr>
<tr>
<td></td>
<td>Incremental Operating Costs ($Million)</td>
<td>20.6</td>
<td>19.5</td>
<td>19.9</td>
<td>15.1</td>
<td>12.1-12.2</td>
<td>8.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Potential for Phased Implementation</td>
<td>Phasing flexibility</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Deliverability</td>
<td>Ease of Obtaining Site</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td></td>
<td>Environmental Requirements</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
</tbody>
</table>

*Based on the PSLUP, Site 14 could possibly be obtained at no cost from the province (see Section 3.4 for further details).
The Multiple Account Evaluation does not suggest any clear winner in the form of a single site or configuration that performs better than all other candidates on every performance measure and hence, some degree of trade-off is required in order to select a site. The performance measures are qualitative in nature, and their relative weighting/importance is something to be determined by the client based on their priorities.

Finally, Site 14 Configuration 2 has a high deliverability risk, due to the need to shift the TransitWay alignment and stop location south of the envisioned alignment. At an initial meeting with MTO, they have not indicated a willingness to consider this, and if such a change were to occur, it would likely require more negotiation. Beyond providing additional flexibility for potential layouts on Site 14 as per the discussion above, a re-aligned TransitWay would also better facilitate intermodal transfers at this node.

Both Configurations for Site 19 are generally considered to be fairly poor performing. The only real advantage they have over the Base Case is their larger available area and their lack of environmental requirements. The land area is not considered to be a major concern as all sites have sufficient room for future expansion, and the Base Case has a good layout for efficient design. The Environmental Requirements are considered to be a significant source of risk for the site Base Case compared to these sites. This risk has been deemed to be acceptable by the client, particularly in light of the fact that Site 19 comes with its own deliverability risks in the form of possible expropriation requirements. In all other measures, the Base Case performs as well or better than both Site 19 configurations. On this basis, they were removed from consideration.

Site 15 is relatively similar to the Base Case in a number of respects such as operational efficiency and network integration, given it is located in roughly the same position along the corridor. Its main advantages over the Base Case are that it has a shorter spur track (lessening both capital and operations infrastructure costs) as well as lesser environmental permitting requirements. It also has three major shortcomings, namely that the site is envisioned for development, and thus using it as a MSF has a significant opportunity cost incurred. Additionally, and more importantly, as there exists no budget to purchase the site to protect it for future use, and it runs a strong risk of being developed in the meantime, which would make it more expensive to purchase and clear, and could require expropriation from owners. Finally, the capital cost associated with purchasing the site is higher than the base case, possibly significantly so. Both of these items are considered to be a major source of concern to the client, to the degree that they outweigh the advantages that Site 15 has over the Base Case. Thus, it is removed from consideration.

Site 17 is generally considered to be a well-performing site. It’s location towards the middle of the line is attractive from both an operational efficiency and phasing flexibility perspective. The land is already cleared and does not appear to require any additional environmental remediation or permitting. It also features a short spur track, which is both a capital and operations cost savings. It does have a number of drawbacks however. The spur track would possibly have to travel on a shared running ROW, exposing it to the risk road-traffic related service disruptions (e.g. accidents), and has little possibility of being an efficient connection to future LRT lines. Similar to Site 15 however, its biggest drawbacks relate to cost and delivery risks, given that the site is a premium location for light-
industrial/warehouse development. Firstly, the site itself is towards the upper end of the property cost spectrum. Secondly, there is a strong risk that the site will be developed before it can be purchased for use by the HMLRT project. Finally, given the sites excellent location for other uses, the city believes that an MSF is not necessarily the best use for it.

Site 18 performs similarly to Site 17 in some senses (network integration, operational efficiency, phasing flexibility), given its location along the line is relatively similar. It’s upper-estimate of property cost is in fact lower, and this presents a lower property cost risk, than the Base Case, and that it has no major environmental concerns. Its major disadvantage is the stormwater management facility envisioned for the site. Although it was found to be technically possible to accommodate both uses, the level of co-ordination and capital outlay to achieve this is considered to be excessive. Specifically, the incremental costs associated with accommodating the MSF would have to be provided by the HMLRT project; similar to the property purchases for Sites 15 and 17, there is no existing budget for this. Additionally, the projects would require a substantial degree of integrated design, and given uncertain timelines and procurement strategy, this is not necessarily realistically possible. On this basis, Site 18 was found to be inferior to the Base Case.

In summary, the key sources of concern from the client that have helped guide the decision are:

- Site 14 Configuration 2 has a deliverability risk as a result of shifting the TransitWay alignment and stop, which MTO has not indicated a willingness to consider. Despite this, it may be worth pursuing additional negotiation with MTO, as this configuration could otherwise result in significantly improved passenger transfer movements as well as potentially a more favourable MSF site layout
- Site 19 Configurations 1 and 2 are already developed and would be extremely costly in terms of land, environmental remediation, demolition, relocation and compensation
- Sites 15 and 17 are privately owned and a significant risk of being developed prior to being procured for the HMLRT project given there is no budget. Additionally, using these sites means they cannot be used for other uses.
- Site 18 is likely to be the location of a stormwater management facility; although this is not entirely certain.

It is therefore recommended that Site 14 be adopted as the preferred site for the purposes of TPAP evaluation, and carried forward for further development largely as a result of its ability to be affordable and reduce the capital costs associated with constructing the projects in the first place, potentially by over 40% under some scenarios. Additionally, the land is protected from use by other developments, thereby reducing delivery risk, and incurring no opportunity cost.

The exact layout of the Site is will be subject to further development as part of the functional design process. All land within the grey- and green-hatched areas in Figure 3.1 is potentially available for use as per the Base Case; provided it also accommodates the ancillary facilities for the TransitWay.

The next stage of design development, functional design, will further evaluate the site operations, interactions with neighbouring uses, and other constraints. The goal of this
stage will be to generate a good functional design for the site and establish any modification
to the HMLRT main line stations and interactions with the MTO TransitWay. The final
arrangement will be subject to further negotiation and inputs from MTO and other key
stakeholders.

Should Site 14 prove undeliverable for any reason, Sites 17 and 18 are recommended as
fall-back sites. Both of them perform strongly on their technical aspects; their main
determents are related to cost and/or uncertainties regarding deliverability. Depending on
how a number of factors beyond the control of the HMLRT project team play out on these
sites, several or all of these issues may cease to be concerns, and as such the sites could
provide viable alternative locations for the MSF.
Appendix A: Summary of Environmental Assessments for Each Site
<table>
<thead>
<tr>
<th>MSF Site #</th>
<th>Built Cultural Heritage</th>
<th>Archaeological Assessment</th>
<th>Hydrogeology</th>
<th>Contaminated Sites</th>
<th>Natural Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site #14</td>
<td>Not located on or adjacent to any known heritage properties.</td>
<td>Retains archaeological potential—will require Stage 1-2 archaeological assessment unless assessment has been done previously. Site 14 was only partially assessed as part of the Stage 1 Archaeological Assessment undertaken in February 2010 as part of the Master Plan investigations. None of the other sites were included in the Stage 1 assessment report.</td>
<td>Least preferred (with site 18) due to presence of stream on site, likelihood of some long term reduction to groundwater discharge to stream due to change to impermeable surface (if this area will be developed in the long term regardless, then this point is moot though) and diversion of rainwater runoff to storm sewer system.</td>
<td>No known or suspected contaminated site issues. Site has not been subject to prior development.</td>
<td>Headwater tributary of Etobicoke Creek on site appears that it may be intermittent; The riparian zone is fairly narrow although portions of the riparian zone appear to be wetland habitat and there is a small ponded area in the centre of the reach – would likely have standing water and provide habitat for birds and small mammals; Large portions of this tributary have been straightened in the downstream reaches along with accompanying losses of riparian vegetation so the remnant riparian vegetation in this reach is important overall for shading, allochthonous energy inputs as well as providing habitat for small mammals and birds; This tributary likely supports fish habitat indirectly through baseflow contribution and input of allochthonous material to downstream fish habitats; Most natural vegetation has been cleared for agricultural or other land uses; however, there is remnant natural vegetation associated with the tributary of Etobicoke Creek. This consists of trees and shrubs along the banks of the watercourse as well as woody and herbaceous riparian vegetation. Alteration of the watercourse and disruption of wooded, riparian habitat would be required for construction of the MSF. A work permit from TRCA be required for any regulated area near or associated with a watercourse. Breeding activities were observed from species such as American Robin, Yellow Warbler, Cedar Waxwing, Gray Catbird, Eastern Kingbird (Tyrannus tyrannus), Eastern Wood Pewee and Song Sparrow. Barn Swallows were feeding fledging young. The large fields of crops adjacent to the tributary...</td>
</tr>
<tr>
<td>MSF Site #</td>
<td>Built Cultural Heritage</td>
<td>Archaeological Assessment</td>
<td>Hydrogeology</td>
<td>Contaminated Sites</td>
<td>Natural Environment</td>
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<tr>
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</tr>
<tr>
<td>Site #15</td>
<td>Not located on or adjacent to any known heritage properties.</td>
<td>Retains archaeological potential will require Stage 1-2 archaeological assessment unless assessment has been done previously.</td>
<td>No hydrogeological issues other than reduction of permeable surface that is currently grassed – diversion of rainwater to storm sewer system (if this area will be developed in the long term regardless, then this point is moot though)</td>
<td>No known or suspected contaminated site issues. Site has not been subject to prior development.</td>
<td>contained Spotted Sandpiper (<em>Actitis macularius</em>) with young, nesting Killdeer (<em>Charadrius vociferus</em>) and a colony of Savannah Sparrows (<em>Passerculus sandwichensis</em>) singing on territory. White-tailed Deer and Coyote tracks and trails, found alongside the creek tributary, indicated its use as a travel corridor. For both configurations, breeding behaviour of adult Barn Swallows and fledgling was observed. Barn Swallows and its habitats are protected under the Endangered Species Act (ESA) and ranked as a threatened species provincially. Barn Swallows also have a strong site fidelity to a particular nesting area however no nests could be found within the vicinity of any potential areas of impact along all of Hurontario Street. A permit under Ontario Endangered Species Act (ESA) would be required at both Configurations 1 and 2. Small, headwater tributary of Fletchers Creek; Watercourse is intermittent and does not appear to provide direct fish habitat but does provide indirect fish habitat to downstream watercourses; This tributary likely supports fish habitat indirectly through baseflow contribution and input of allochthonous material to downstream fish habitats; Most natural vegetation has been cleared for agricultural or other land uses; however, there is remnant natural vegetation associated with drainage swales as well as the tributary of Fletcher's Creek. This consists of trees and shrubs along the banks of the watercourse as well as woody and herbaceous riparian vegetation. Large cultural meadows provide the dominate habitat features. Similar to the habitat on the southeast side of Hurontario Street, Barn Swallow, Northern Rough-winged Swallow (<em>Stelgidopteryx serripennis</em>), Northern Mockingbird (<em>Mimus</em>...</td>
</tr>
<tr>
<td>Site #</td>
<td>Built Cultural Heritage</td>
<td>Archaeological Assessment</td>
<td>Hydrogeology</td>
<td>Contaminated Sites</td>
<td>Natural Environment</td>
</tr>
<tr>
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<td>---------------------</td>
</tr>
<tr>
<td>17</td>
<td>Located on a property that is listed on the Mississauga Heritage Register (6250 Hurontario St.)</td>
<td>Appears disturbed by previous development-- likely previously assessed.</td>
<td>No hydrogeological issues – hydrogeologically preferred site.</td>
<td>No known or suspected contaminated site issues. Due to preparation for development, it is likely that investigations were completed to identify contaminated site issues (if any). Historical use as farm until recent past makes it unlikely to have been subject to significant contamination.</td>
<td>As there are no watercourses on Site 17 there are no aquatic or terrestrial habitat constraints. The area is a large, open cultural meadow. Killdeer, Spotted Sandpiper, Savannah Sparrow and Barn Swallows foraged and bled in this area. American Goldfinch and Mourning Dove were common. There were no obvious mammal tracks or trails through the area. Therefore this site is recommended for development of the MSF.</td>
</tr>
<tr>
<td>18</td>
<td>Not located on or adjacent to any known heritage properties.</td>
<td>Northern portion appears to retain archaeological potential-- will require Stage 1-2 archaeological assessment unless assessment has been done</td>
<td>Least preferred (with site 14) due to presence of buried stream culverted through on site, likelihood of some long term reduction to groundwater infiltration due to</td>
<td>While no known contaminated site issues have been brought to our attention, it is common in some urban areas for parks to have been developed with imported fill (sometime contaminated) or on top of old contaminated sites (landfills etc.). Therefore this property is considered the second most likely</td>
<td>Small, grassed swale that flows through a culvert beneath Matheson Blvd; Watercourse is intermittent and may be ephemeral and provides indirect fish habitat only; A work permit will be required for any regulated area near or associated with a watercourse.</td>
</tr>
<tr>
<td>MSF Site #</td>
<td>Built Cultural Heritage</td>
<td>Archaeological Assessment</td>
<td>Hydrogeology</td>
<td>Contaminated Sites</td>
<td>Natural Environment</td>
</tr>
<tr>
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</tr>
<tr>
<td>Site #19</td>
<td>Not located on or adjacent to any known heritage properties.</td>
<td>Does not appear to retain archaeological potential.</td>
<td>There are no hydrogeological issues – could be of benefit if some of the currently impervious surface is converted to more permeable – hydrologically acceptable site.</td>
<td>This is the least preferred of the options from a contaminated site perspective. There are multiple developments, some of which are commonly associated with contaminated sites, including an Imperial Oil gas station, a manufacturing facility (Nye Thermodynamics), an automotive parts dealership and garage (Colallillo Tires and Lube), as well as typical commercial uses. Fielding Chemical Technologies is also located in the southern portion of the plot, depending on the ultimate area required, would</td>
<td>There are no natural features at this location and no wildlife species were observed during the site visit. As there are no watercourses on Site 19 there are no aquatic or terrestrial habitat constraints. Therefore this site is recommended for development of the MSF.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>to be subject to potential contamination concerns. The existing building on the site is currently occupied by a data security company and is unlikely to be a potential significant contaminant source.</td>
<td>associated with a watercourse; This site appears to be maintained (i.e. mowed) on a regular basis and the mower drives directly over the grassed swale; Natural vegetation has been cleared from this site, and the majority of the property is groomed for agricultural or other purposes. The area is almost entirely mown grass with a small section of cultural meadow and provides minimal wildlife habitat. The only birds utilizing this site were American Goldfinch, Red-winged Blackbird and Song Sparrow. Barn Swallows were seen overhead but no nests were found. There were no obvious mammal tracks or trails through the area. As the tributary is marginal and indirect fish habitat at best, and there are no significant impacts to natural vegetation this site is recommended for development of the MSF.</td>
</tr>
</tbody>
</table>
need to be included, or would be an adjacent neighbor. They deal specifically with solvents, which are noted to be extraordinarily difficult contaminants to remediate. Regardless, it is likely that at a minimum costs on the order of hundreds of thousands of dollars would need to be spent on environmental investigations as well as the Designated Substance Surveys that are required by the Ministry of Labour for each building prior to demolition activities.
Appendix B: Parkway Belt Area Maps
Appendix C: Detailed MAE Scoring Summary
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Measure</th>
<th>Site 14 – Configuration 1</th>
<th>Site 14 – Configuration 2</th>
<th>Site 15</th>
<th>Site 17</th>
<th>Site 18</th>
<th>Site 19 – Configuration 1</th>
<th>Site 19 – Configuration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Resiliency</td>
<td></td>
<td>Base Case.</td>
<td>Similar to the Base Case, the spur track is on an exclusive Right of Way except at the turnout.</td>
<td></td>
<td></td>
<td></td>
<td>The spur track would be constructed on a separate on-street Right of Way.</td>
<td>The rationale is the same as that for Site 19 Configuration 1.</td>
</tr>
<tr>
<td>Network Integration</td>
<td></td>
<td>Configuration 2 is on the same site as the Base Case, therefore Network Integration potential is the same (strong potential for Hwy 407 TransitWay LRT, limited/no potential for other lines).</td>
<td>Site 15 is across the street from the Base Case, therefore Network Integration potential with other lines is the same.</td>
<td>Site 17 is not located near any of the four hypothetical intersecting LRT lines.</td>
<td>Site 18 is not located near any of the four hypothetical intersecting LRT lines.</td>
<td>Site 19 is not located near any of the four hypothetical intersecting LRT lines except Dundas, but would require significant detour or extensive spur track to serve as an MSF for a Dundas LRT.</td>
<td>The rationale is the same as that for Site 19 Configuration 1.</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Measure</td>
<td>Site 14 – Configuration 1</td>
<td>Site 14 – Configuration 2</td>
<td>Site 15</td>
<td>Site 17</td>
<td>Site 18</td>
<td>Site 19 – Configuration 1</td>
<td>Site 19 – Configuration 2</td>
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</tr>
<tr>
<td>Capacity and Layout</td>
<td>Capacity and Layout</td>
<td>Base Case.</td>
<td>Base Case.</td>
<td>The available area is slightly larger, and has additional flexibility in terms of allowing the MSF to be constructed without necessarily having to cross Etobicoke Creek.</td>
<td>Site 15 is a slightly awkward shape, but a sketch-planning exercise yielded a design that is both operational efficient and of sufficient capacity.</td>
<td>Site 17 has an abundance of potential space, and therefore has room to allow for both an efficient and appropriately sized design.</td>
<td>Site 18 has an abundance of potential space, and therefore has room to allow for both an efficient and appropriately sized design.</td>
<td>Site 19 Configuration 1 has an abundance of potential space, and therefore has room to allow for both an efficient and appropriately sized design.</td>
</tr>
<tr>
<td>Land Use Compatibility</td>
<td>Existing Site Conditions</td>
<td>Base Case.</td>
<td>Similar concerns to the Base Case, but this site layout does not necessarily require Etobicoke Creek to be disturbed.</td>
<td>Site 15 is also a greenfield lot, and no contamination is expected. The envisioned design does not require crossing any watercourses.</td>
<td>Site 17 is a brownfield location that has already been pregraded for construction. Its previous uses make it unlikely to have been contaminated.</td>
<td>Site 18 is formally designated as a municipal park, but is largely undeveloped. However, a stormwater management facility is planned for this site, which means both facilities must be designed to accommodate the other.</td>
<td>The eastern portion of Site 19 encompassed by Configuration 1 is currently occupied by industrial uses, all of which would require relocation and demolition of structures for the area to be used for an MSF. The site may have extensive contamination.</td>
<td></td>
</tr>
</tbody>
</table>

This site has very similar concerns to Configuration 1, except that it may not have the same level of contamination present.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Measure</th>
<th>Site 14 – Configuration 1</th>
<th>Site 14 – Configuration 2</th>
<th>Site 15</th>
<th>Site 17</th>
<th>Site 18</th>
<th>Site 19 – Configuration 1</th>
<th>Site 19 – Configuration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Envisioned Future Land Use</td>
<td></td>
<td></td>
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<td></td>
<td>The rationale is the same as that for Site 19 Configuration 1.</td>
</tr>
<tr>
<td>Base Case.</td>
<td></td>
<td>Base Case.</td>
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</tr>
<tr>
<td>The area used under this configuration is envisioned for use as facilities for the Highway 407 TransitWay</td>
<td></td>
<td></td>
<td>Site 15 is envisioned for use as a residential development.</td>
<td></td>
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</tr>
<tr>
<td>Similar to Base Case, surrounding uses are for electrical transmission, transportation and light industrial, all of which are considered to be compatible.</td>
<td></td>
<td>Adjacent land uses are similar to that found at the Site 14 configurations, hence the same score.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Surrounded land uses are either transportation (Highway 401) or light industrial, both of which are considered compatible.</td>
<td></td>
<td>Surrounding land uses are light industrial, which is considered compatible.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>This configuration has residential uses on 3 sites.</td>
<td></td>
<td>This configuration has residential uses to the north.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Measure</td>
<td>Site 14 – Configuration 1</td>
<td>Site 14 – Configuration 2</td>
<td>Site 15</td>
<td>Site 17</td>
<td>Site 18</td>
<td>Site 19 – Configuration 1</td>
<td>Site 19 – Configuration 2</td>
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<td>---------------------------</td>
</tr>
<tr>
<td>Anticipated Costs</td>
<td>Property Cost</td>
<td>$0 or $30-$40 Million Base Case.</td>
<td>$0 or $30-$40 Million Across-the-fence rate is the same as the Base Case ($3.75m - $5m per hectare), and is still owned by MTO, and thus might be able to be obtained for at no cost (this agreement applies to transit lines, not necessarily to an MSF), so the lower bound is reduced by half. For 8 hectares, the anticipated cost is therefore in the range of $0m to $40m.</td>
<td>$34-$45 Million Site is privately owned and is therefore expected to cost 3.75m - $5m/ha. Due to the shape of the site a larger area of approximately 9 hectares will be required, and hence be more expensive.</td>
<td>$30- $40 Million Both the cost rate and the area of property required are anticipated to be very similar to Site 14, except as this site is privately, not provincially, owned and therefore not able to obtain easement rights at a reduced rate.</td>
<td>$16- $57 Million This property cost for this site was quoted by City of Mississauga staff at approximately half the unit rate of some of the other sites, making it very attractive.</td>
<td>$38-46 Million The property cost for this site is estimated to be above the upper range of the estimate for all other sites, including the Base Case.</td>
<td>$38-46 Million The property cost for this site is estimated to be above the upper range of the estimate for all other sites, including the Base Case.</td>
</tr>
<tr>
<td>Criteria</td>
<td>Measure</td>
<td>Site 14 – Configuration 1</td>
<td>Site 14 – Configuration 2</td>
<td>Site 15</td>
<td>Site 17</td>
<td>Site 18</td>
<td>Site 19 – Configuration 1</td>
<td>Site 19 – Configuration 2</td>
</tr>
<tr>
<td>--------------------------------</td>
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<td>-----------------------------</td>
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</tr>
<tr>
<td><strong>Incremental Capital Costs</strong></td>
<td></td>
<td>$6.2 Million Base Case.</td>
<td>$2.5 Million</td>
<td>$9.2 Million This site would not require works associated with crossing Etobicoke Creek. The spur track is also shorter.</td>
<td>$3 Million This site is straightforward to build on, as it is already empty and graded. It does not feature any watercourses that require crossing, and the spur line is relatively short.</td>
<td>$25.6-$26.4 Million This site would require that a proposed stormwater management facility for this site have its design extensively (and expensively) modified to allow the MSF to be constructed at this site. This incremental cost would need to be covered by the HMLRT project.</td>
<td>&gt; $36.2 Million The site is currently occupied, and would need to be vacated, resulting in costs for tenant relocation, business losses and expropriation costs. Additionally, portions of the site an anticipated to be contaminated, and could require extensive remediation. Finally, the spur track is also longer than Site 14.</td>
<td>&gt;$39.9 Million The concerns for this configuration are similar to those outlined for Configuration 1, except that the contamination related costs are expected to be lower. However, the site also does require a longer spur track.</td>
</tr>
<tr>
<td><strong>Incremental Operating Costs</strong></td>
<td></td>
<td>$20.6 Million Base Case.</td>
<td>$19.5 Million Similar to the Base Case, the site is in a poor location for service deployment, but in this configuration, the spur track is significantly shorter.</td>
<td>$19.9 Million Similar site location to the base case, but the spur track is somewhat shorter.</td>
<td>$15.1 Million Located relatively close to the centre of the line, and has a short spur track.</td>
<td>$12.1-$12.2 Million Favourable geographic location along the line, and the spur track for this Site is somewhat shorter than Site 14.</td>
<td>$8.4 Million Has a long spur track, but vehicles reach the mainline at a logical place to start/end service, and hence have lower deadhead costs.</td>
<td>$9.0 Million Has a very long spur track, but vehicles reach the mainline at a logical place to start/end service, and hence have lower deadhead costs.</td>
</tr>
</tbody>
</table>
### Potential for Phased Implementation

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Measure</th>
<th>Site 14 – Configuration 1</th>
<th>Site 14 – Configuration 2</th>
<th>Site 15</th>
<th>Site 17</th>
<th>Site 18</th>
<th>Site 19 – Configuration 1</th>
<th>Site 19 – Configuration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phasing flexibility</td>
<td>Base Case.</td>
<td>Similar to the Base Case, this configuration is fairly northerly along the line, and therefore reduces the convenience of certain phasing strategies.</td>
<td>Similar to the Base Case, this site is fairly northerly along the line, and therefore reduces the convenience of certain phasing strategies.</td>
<td>As this site is closer to the centre of the overall line, it would allow greater flexibility than Site 14 in terms of how the project is phased.</td>
<td>As this site is closer to the centre of the overall line, it would allow greater flexibility than Site 14 in terms of how the project is phased.</td>
<td>This site is fairly southerly along the line, and therefore reduces the convenience of certain phasing strategies.</td>
<td>The rationale is the same as that for Site 19 Configuration 1.</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Measure</td>
<td>Site 14 – Configuration 1</td>
<td>Site 14 – Configuration 2</td>
<td>Site 15</td>
<td>Site 17</td>
<td>Site 18</td>
<td>Site 19 – Configuration 1</td>
<td>Site 19 – Configuration 2</td>
</tr>
<tr>
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<td>---------------------------</td>
</tr>
<tr>
<td>Deliverability</td>
<td>Ease of Obtaining Site</td>
<td>Base Case</td>
<td></td>
<td>Site 15 privately owned by a residential developer. Given that the project has no budget to proactively purchase the site, there is a risk that it may be developed in the interim, which would make procuring it at a later date significantly more complicated.</td>
<td>Site 17 is privately owned by an industrial real estate developer. Given that the project has no budget to proactively purchase the site, there is a risk that it may be developed in the interim, which would make procuring it at a later date significantly more complicated.</td>
<td>Site 18 is owned by the City of Mississauga, and is the site of a proposed stormwater management facility. The site could be shared, but it is believed that the co-ordination would be challenging, and would possibly require up-front investment from HMLRT. This site is considered a “delivery” risk rather than a “procurement” risk.</td>
<td>This configuration displaces a number of businesses which may be reluctant to leave, and a landowner(s) reluctant to sell. This site has the potential risk to require expropriation, which is an avenue of last resort.</td>
<td>The rationale is the same as that for Site 19 Configuration 1.</td>
</tr>
<tr>
<td>Criteria</td>
<td>Measure</td>
<td>Site 14 – Configuration 1</td>
<td>Site 14 – Configuration 2</td>
<td>Site 15</td>
<td>Site 17</td>
<td>Site 18</td>
<td>Site 19 – Configuration 1</td>
<td>Site 19 – Configuration 2</td>
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<tr>
<td>--------------------------</td>
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<td>---------</td>
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<td>---------------------------</td>
</tr>
<tr>
<td>Environmental Requirements</td>
<td></td>
<td>Base Case.</td>
<td></td>
<td>This site would require a CVC work permit for any construction near a watercourse (Fletcher's Creek). Retains archaeological potential and will require a Stage 1 and 2 Archaeological Assessment unless the assessments have been completed previously.</td>
<td>This site has no known supplementary environmental requirements.</td>
<td>This site would require a CVC work permit for any construction near a watercourse (Cooksville Creek). Retains archaeological potential and will require a Stage 1 and 2 Archaeological Assessment unless the assessments have been completed previously.</td>
<td>This layout is built on land with no known supplementary environmental permitting requirements. However a significant amount of site remediation is anticipated.</td>
<td>This layout is built on land with no known supplementary environmental permitting requirements. However a significant amount of site remediation is anticipated.</td>
</tr>
</tbody>
</table>
Document Revision History

Revision PA:
Initial screening assessment based on the sites contained in a memo from the Master plan, as well as two more sites suggested by the consultant team and the client.

Revision PB:
Several sites previously thought to be potential candidates for review were removed from consideration as a result of additional client requirements. Additionally, three sites suggested by the client were added to the review. A more detailed assessment of the merits of the relevant sites was added, as well as a selection of the two preferred site and recommendations for City of Mississauga staff.

Revision PC:
Client comments incorporated including revision to MAE structure.

Revision PD:
Updates as per client comments and additional assessment.

Revision PE:
Pre-Final submission of report.

Revision 0:
Final submission of report.
The Hurontario-Main Light Rail Transit system (HMLRT) is proposed to run for approximately 24 km from a southern terminus in Port Credit, Ontario north to the GO station in Downtown Brampton, with possible future northern extensions. A loop to allow for service around downtown Mississauga will also be provided. In addition to on-line infrastructure, the HMLRT project will require a maintenance and storage facility (MSF) to facilitate overnight train storage, vehicle cleaning and repair, operations management and administrative functions.

A previous report entitled Preliminary Maintenance and Storage Facility (MSF) Assessment Report was issued (and included in the EPR as Appendix B.13) detailed the site selection process that was undertaken to select the preferred location of the MSF. Ultimately, it determined that the MSF should be located on the provincially owned lands bounded by Hurontario Street, Highway 407, Kennedy Road and a Hydro One Networks Inc. transmission tower corridor. The design of the MSF site must accommodate a number of criteria, including:

- A maximum site width of 155m is available.
- Space is required to accommodate up to 53 LRV’s initially, and 80 over the long term, per the most recent version of the Preliminary System Operations Plan report.
- All other required storage, maintenance, operations and administration uses are to be provided on site.
- All aspects of the TransitWay project, either in their envisioned form or an alternative-but-equivalent form.

Two initial design concepts were developed for the MSF that place the infrastructure as far west as possible, without impacting the TransitWay. These concepts are shown in Appendix A. Subsequent consultation with the Toronto and Region Conservation Authority determined that these designs caused unacceptable impacts to Etobicoke Creek, and would have to be revised so as to limit creek impacts to crossings, rather than building overtop of it.

Further investigation determined that there was insufficient space to accommodate all MSF infrastructures on the west side of the creek while still leaving room for TransitWay facilities. Instead, four revised design concepts were developed, and are shown in Appendix B. These new designs all avoided having anything more than minor crossings of the creek. This was accomplished by either having the MSF split into two separate components on either side of the creek, as in Options 1 and 4, or by moving the entire facility to the east of the creek, as in Options 2 and 3. These four alternatives were evaluated on a number of performance criteria, which is detailed in Appendix C. Options 2 and 3 both performed equally well, and better than 1 and 4. Option 3 was ultimately selected because although it had slightly higher costs, it was also found to be safer. A detailed representation of the preferred design, Option 3, is included in Appendix D.
Appendix A
Initial Design Concepts
Appendix B
Revised Design Concepts
Appendix C
Evaluation of Revised Design Concepts
Alternatives for the General Layout

Date: 2013-07-02

Basics

The examination and evaluation is based on the changed conditions regarding the usage of the site in accordance with the coordination meeting on 17/18 June 2013 in Toronto and the resulting alternatives 1 to 4 (see appendix).

The aim is an evaluation of the alternatives, which takes the resulting geometry under consideration, and the naming of a preferred alternative, whose layout in CAD-format is to be presented by VCDB until 6 July 2013.

The following substantial parameters are to be considered:

- North of the site: Corridor for transitway, width 30 meters
- South of the site: utility corridor, width 30 meters
- Maximum width of the site: 155 meters
- Green belt (creek plus site area) NOT to be covered; bridge(s) possible
- Separation of track and road as far as possible, i.e. no crossing at the entrance area
- Operation of the trams in 2 x 30 meter trainsets

Alternatives

ALT 1  Alternative 1
- Main and dedicated entrance (track and road) at Hurontario Street, east of bus terminal
- Workshop and administration building west of the creek, stabling shed north-east of the creek
- Stabling shed with bypass track
- One main access road

ALT 2  Alternative 2
- Track entrance at Hurontario Street, road entrance at Kennedy Rd.
- Workshop, stabling shed and administration building in a compact layout east of the creek
Comparison of Alternatives for the General Layout

ALT 3
- Track entrance at Hurontario Street, road entrance at Kennedy Rd.
- Workshop, stabling shed and administration building in a compact layout east of the creek
- Administration building / side workshops south of site (workshop building mirrored from Alt 2)
- Stabling shed with bypass track
- Two access roads necessary

ALT 4
- Main entrance (track and road) at Hurontario Street
- Workshop and administration building west of the creek, stabling shed south-east of the creek
- Stabling shed without bypass track (dead end tracks)
- One main access road

Technical Examination

The following dimensions should be understood as guide values and discussed during the further planning process.

Dimensions

Workshop with reduced scope, without administration (length x width): 153 x 78 meters

Workshop with bogie repair, without administration (length x width): 180 x 74 meters
- Clearing for the bogie repair by building extension of 30 meters
- Decrease of width of side workshops
- Additional workbay on UWL-track (or non-interacting opportunities UWL – measure track)

Stabling shed; 56 trams, 7 tracks (length x width): 252 x 38 meters
Stabling shed; 56 +18 trams, 9 tracks (length x width): 282 x 50 meters
Optional stabling shed; 18 trams, 6 tracks for 3 x 30m (length x width): 95 x 33 meters

1 Without bogie repair.
Comparison of Alternatives for the General Layout

Optional paint booth (length x width): 50 x 22 meters
Single-lane road + one-sided sidewalk (width): 3.5 + 1.5 = 5.0 meters
Two-lane road + both-sided sidewalk (width): 6.0 + 2x1.5 = 9.0 meters
Bypass track, including escape way (width): 5.5 meters

Examination of width of site

Alternative 1
Site width is sufficient for all layouts of workshop and stabling shed. No detailed examination necessary.

Alternative 2
For this alternative, it is assumed that the stabling shed can be extended by two optional tracks, because an additional stabling shed west of the creek causes difficulties for operations scheduling and increases investment costs (bridge, tracks, switches, and OHL).

Alternative 2 demands at least the following site width:

<table>
<thead>
<tr>
<th>Description</th>
<th>Width (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass track</td>
<td>5.5</td>
</tr>
<tr>
<td>Single-lane road</td>
<td>5.0</td>
</tr>
<tr>
<td>Stabling shed including optional extension</td>
<td>50.0</td>
</tr>
<tr>
<td>Two-lane road</td>
<td>9.0</td>
</tr>
<tr>
<td>Workshop with reduced scope</td>
<td>78.0</td>
</tr>
<tr>
<td>Bypass track</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>153.0</strong></td>
</tr>
</tbody>
</table>

With a maximum site width of 155 meters, Alternative 2 is feasible — but has only limited reserve for design change.

Alternative 3
For this alternative, again it is assumed that the stabling shed can be extended by two tracks.

Alternative 3 demands at least the following site width:

<table>
<thead>
<tr>
<th>Description</th>
<th>Width (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass track</td>
<td>5.5</td>
</tr>
<tr>
<td>Single-lane road</td>
<td>5.0</td>
</tr>
<tr>
<td>Stabling shed including optional extension</td>
<td>50.0</td>
</tr>
<tr>
<td>Two-lane road</td>
<td>9.0</td>
</tr>
<tr>
<td>Workshop with reduced scope</td>
<td>78.0</td>
</tr>
<tr>
<td>Single-lane road</td>
<td>5.0</td>
</tr>
<tr>
<td>Bypass track</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>158.0</strong></td>
</tr>
</tbody>
</table>

With a maximum available site width of 155 meters, Alternative 3 is not feasible without further adjustments.
Comparison of Alternatives for the General Layout

The following adjustments are useful and possible:

- Longer, but less wide workshop
  – advantage: integration of bogie repair into the workshop center
  – neutral: narrower side workshop

- Combination of bypass track north of the stabling shed with the bypass road (both infrastructure elements are not used very frequently)

With these adjustments, alternative 3 demands at least the following site width:

<table>
<thead>
<tr>
<th>Description</th>
<th>Width (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass track including single-lane road</td>
<td>5.5</td>
</tr>
<tr>
<td>Stabling shed including optional extensions</td>
<td>50.0</td>
</tr>
<tr>
<td>Two-lane road</td>
<td>9.0</td>
</tr>
<tr>
<td>Workshop</td>
<td>74.0</td>
</tr>
<tr>
<td>Single-lane road</td>
<td>5.0</td>
</tr>
<tr>
<td>Bypass track</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>149.0 meters</strong></td>
</tr>
</tbody>
</table>

The examination shows that it is adequate to carry out one of the adjustments to comply with the maximum site width.

Alternative 4

Site width is sufficient for all layouts of workshop and stabling shed. No detailed examination necessary.

Conclusion

All alternatives can be realised on the provided site.
Evaluation of the Alternatives

General Approach

The alternatives are evaluated according to their expected advantages and disadvantages. For the time being no cost estimation on the basis of detailed calculated volumes or material is made. An estimate is made looking at the obvious and expected extra cost or cost savings both on investment level and on operating cost level.

Hence it is possible to choose a smaller or larger workshop building this decision is “cost neutral”.

To achieve a presentable evaluation, all items will be weighed. There will be awarded 1 to 3 points for each characteristic, where 1 point means a poor and 3 points a strong closeness to the desired value. Nevertheless it should be taken into account that this assessment can only represent a rough estimation as more individual criteria exist and each of them might have a higher or lower importance.

Alternative 1

Access Situation

Advantages:

- Clear separation of track and road
- Access through one side only, i.e. clear arrangement for gate keeper / dispatcher
- Good link to central parking lot and tram station

Disadvantages:

- None evident

Operations and Route Relations

Advantages:

- Bypass through stabling shed towards workshop, which results in less shunting effort (in comparison to ALT.4) and flexibility of movement (also in case of failure or maintenance of switches)

Disadvantages:

- Very long ways for trams on site
- Very long and hardly acceptable ways for drivers and service staff

Investment costs

Advantages:

- None
Comparison of Alternatives for the General Layout

Disadvantages:
- Very long track and OHL length
- Detached building, long supply lines
- At least two bridge constructions

Operating costs
Advantages:
- None evident

Disadvantages:
- Very high staff and vehicle km-costs due to long ways between workshop/administration and stabling shed

Area Usage and Expandability
Advantages:
- If necessary, the bypass track can be used to connect a maintenance of way building or a paint booth

Disadvantages:
- Very high area usage
- Constraint for future utilization

Alternative 2
Access Situation
Advantages:
- None evident (in comparison to all other alternatives)

Disadvantages:
- Crossing of the access road and sidewalk (from the parking lot to the administration building) with the entry track (towards the stabling shed)
- Tram entrance at Hurontario Street and road entrance at Kennedy Rd. implicate difficult arrangement for gate keeper / dispatcher
- No direct connection between road entrance and tram station and parking lot, respectively
Comparison of Alternatives for the General Layout

Operations and Route Relations

Advantages:

- Very compact alignment of the building with central area for administration and social facilities results in optimal route relations towards workshop and stabling shed
- Short track lengths from stabling shed to workshop/service area, i.e. fast scheduling

Disadvantages:

- None

Investment Costs

Advantages:

- Compact construction type with short track lengths if internal bypass
- Shortening of road connection

Disadvantages:

- Longer track connection from Hurontario Street

Operating costs

Advantages:

- Very short ways, efficient operations
- Minimal track and OHL length decrease maintenance effort and vehicle wear

Disadvantages:

- None

Area Usage and Expandability

Advantages:

- Effective utilization of eastern area due to compact construction type
- Separate paint booth possible, if necessary (to be discussed)
- Possibility of usage of western area for
  - Extension buildings
  - Maintenance of way building
  - Fallback for paint booth
Comparison of Alternatives for the General Layout

Disadvantages:
- None

Alternative 3

Access Situation

Advantages:
- No crossing of the access road and sidewalk (from the parking lot to the administration building) with the entry track (towards stabling shed)

Disadvantages:
- Tram entrance at Hurontario Street and road entrance at Kennedy Rd. implicate difficult arrangement for gate keeper / dispatcher
- No direct connection between road entrance and tram station and parking lot, respectively

Operations and Route Relations

Advantages:
- Very compact alignment of the buildings results in optimal route relations towards workshop and stabling shed
- Short track lengths for stabling in workshop/service area; fast dispatching

Disadvantages:
- Administration and recreational areas situated in southern direction, i.e. longer walkways for drivers and service staff towards stabling shed (in comparison to ALT.2)

Investment Costs

Advantages:
- Compact layout with short track lengths for internal bypass

Disadvantages:
- Longer track connection from Hurontario Street
- Additional road connection necessary for side workshops / magazine situated in southern area

Operating Costs

Advantages:
- Very short ways, efficient operations
Comparison of Alternatives for the General Layout

- Minimum track and OHL length decrease maintenance effort and tram kilometers

Disadvantages:
- Slightly longer walkways for drivers and service staff towards stabling shed (in comparison to ALT.2)

Area Usage and Expandability

Advantages:
- Effective utilization of eastern area due to compact construction type
- Separate paint booth possible, if necessary (to be discussed)
- Possibility for usage of western area for
  - Extension buildings
  - Maintenance of way building and lay down area
  - Fallback for paint booth

Disadvantages:
- None

Alternative 4

Access Situation

Advantages:
- Clear separation of track and road
- Access through one side only, i.e. clear arrangement for gate keeper / dispatcher
- Good link to central parking lot and tram station

Disadvantages:
- None evident

Operations and Route Relations

Advantages:
- None evident

Disadvantages:
- Very high shunting effort
- Constricted flexibility of movement
Comparison of Alternatives for the General Layout

- Very long ways for trams on site
- Very long walkways for drivers and service staff

Investment Costs

Advantages:
- Only one switch “field” in front of the stabling shed
- No bypass track

Disadvantages:
- Not as compact as ALT.1 and ALT.2 due to high area usage higher development costs

Operating Costs

Advantages:
- Less maintenance effort for tracks and OHL (in comparison to ALT.1)

Disadvantages:
- Very high staff and vehicle costs due to long ways between workshop/administration and stabling shed

Area Usage and Expandability

Advantages:
- Due to the missing bypass track, the eastern area can be used more generously (in comparison to ALT.1)

Disadvantages:
- High area usage
- Due to the missing bypass track, future utilization of unused ground must be made accessible by additional switches/shunting
Comparison of Alternatives for the General Layout

Overview of results

<table>
<thead>
<tr>
<th></th>
<th>ALT.1</th>
<th>ALT.2</th>
<th>ALT.3</th>
<th>ALT.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access situation</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Operations and route relations</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Investment costs</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Operating costs</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Area usage and expandability</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td><strong>13</strong></td>
<td><strong>13</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

Preferred Alternative and Conclusion

The evaluation shows that ALT.1 and ALT.4 provide advantages regarding the access situation, but fall behind ALT.2 and ALT.3 in respect to the evaluation of operational procedures, route relations, and the expected investment and operating costs.

ALT.2 and ALT.3 convince with a more compact alignment, which leads to lower investment and operating costs. Furthermore, the alternatives use less space and grant a larger freedom in respect to future usage of the unutilized area.

ALT.2 and ALT.3 differ in the alignment of the additional workshop units/storage and the affiliated administration.

With ALT.2, these buildings are aligned centrally, which leads to optimal route relations and minimizes road length. However, the resulting crossing of the entry track and access road and sidewalk, respectively, are rather disadvantageous. Although the crossing could be signalized, a small risk would remain.

By an alignment of storage and administration south of the workshop, the crossing of track and road can be avoided. Although this would demand a second road and ways to the stabling shed would increase slightly, ALT.3 represents our preferred alternative.

The layout of the workshop with a bogie repair, as favored in the last coordination meeting, is possible for all alternatives.
Appendix D
Alignment and Stop Location Alternatives