

Four steps to delivering reliable and efficient critical sites

Critical sites present an expensive and complex issue for corporate real estate (CRE) executives. They can be as basic as a telephone PABX or as complex as entire facilities devoted to trading floors, data, and call centers. Critical equipment to support these sites can include uninterruptible power supplies (UPS), emergency generators, critical cooling equipment, data servers, building automation, and fire protection systems. However diverse their scope and complexity may be, critical environments share at least one thing in common—they are vital to the continuing operation of the company.

As organizations become increasingly dependent on technology to transact with customers, the demand for data center facilities has become an expensive critical infrastructure requirement.

Today, many organizations are looking to move away from the traditional model of hosting their data centers in established commercial office premises. Instead, they are now looking to build their own sites or identify established sites operated by third-party providers.

Jones Lang LaSalle has identified four key steps that need to be addressed in order to deliver a critical site that is both reliable and efficient.

1. Critical site selection

It is important to thoroughly assess both site availability and a series of site selection criteria in order to identify a location that will meet all your critical site needs.

There are two main options when looking at site availability. The first option is to look at readapting existing buildings. This can become cumbersome and expensive, and in some cases, impossible. This is due to the inadequate structural capacity to support the high floor loading requirements of the modern day “dense servers” environment.

Finding a location that meets your requirements

When looking for an appropriate location, site selection is driven by a number of competing real estate, infrastructure, and technology requirements. Ultimately, your decision about where and how to establish a data center will come down to what requirements can and cannot be “traded” to make a site viable.

Real estate requirements	Infrastructure requirements	Technology requirements
<ul style="list-style-type: none"> • A safe location away from areas prone to natural disasters, airport flight paths, or industrial zones that store or produce hazardous materials • Access to the site must be guaranteed at all times, with no traffic restrictions or likely road closures due to public events • The site should be zoned appropriately, and there should be no local restrictions for the installation of communication towers or satellite dishes 	<ul style="list-style-type: none"> • Access to adequate power supply and feasible energy costs • Ability to install back-up generators and fuel and water storage tanks to support full operational capacity for at least one week • Site security to minimize risk of extreme incidents like bomb threats or sabotage • Business requirements – distance from operational offices (licensing) 	<ul style="list-style-type: none"> • Support multiple telecommunications carrier options and allow carrier diversity • Dual telecommunications delivery paths into the site • Secure utilities and service provider feeds into the site with no single points of failure

The second option is to build new facilities. However, greenfield sites that have all the requisite attributes can be unaffordable in metropolitan districts, while more remote areas can be problematic due to the limited availability of adequate utility and telecommunications infrastructure.

Most corporations aim to achieve Tier II to Tier III classification for their new data center facilities. This is no easy task as it means between 99.741% and 99.982% guaranteed availability of operations.*

**Uptime Institute Site Infrastructure Performance Standards for data centers*

2. Critical site acquisition

A critical site may be secured under different tenures and transaction structures, depending on the size, control, and security requirements for the site. Firstly, being an owner-occupier provides maximum control over the development as well as the ongoing operations. However, this does require major upfront capital, along with having the resources and set-up in place for facility management. Often, a facility catering to a single organization does not provide economies of scale when it comes to the funding of capital-intensive support infrastructure. Therefore, a leasehold tenure could be a far more effective solution.

Depending on the size of your raised-floor space requirements, the leased solution could be a stand-alone building or a dedicated separate wing/pod of a shared building. Alternatively, it could be a co-located solution where you lease raised floor space, or racks in different sizes, in a multi-tenant arrangement, which obviously limits the operational control and security of the facility.

Leasehold transactions for critical sites are very complex compared to those for traditional commercial or industrial facilities. The fit-out, plant, and equipment costs are far greater than the value of the land or building, and high operational costs combined with business-critical uptime requirements add further complications to the lease negotiations. Typically, landlords are reluctant to get involved in the operational complexity, beyond the standard building solution, and will leave this to the tenant to procure and manage. Specialist landlords who provide a complete solution will price the capital outlay and operational risks into the lease deal; hence, it is important to establish a degree of transparency in negotiations regarding the operational costs for the facility and end-of-life upgrades for

critical capital equipment. Commercial mechanisms to ensure guaranteed facility uptime are also complex as the landlord will only be willing to take on a certain level of risk.

The structure of your critical site transaction and tenure will depend on the following influencing factors:

- Facility size and length of tenure
- Appetite for capital outlay
- Degree of operational control/certainty
- Security requirements
- Flexibility requirements

3. Critical environment design and construction

The design of a critical site has to take into consideration the physical aspects and the ongoing operation of the facility while making allowance for future advancements in technology and the changing business requirements. The physical requirements are not just restricted to the enclosure but also extend to ancillary equipment and the routes of pipes/cables etc, both in and out of the space. A balance is required to allow for future expansion without the oversizing of systems or space and spending unnecessarily.

Constructing a critical site is a three-stage process:

1. Physical space and installation of critical systems – the key to this element is achieving integrity of the built form in case of emergency
2. Testing and commissioning – ensuring all support systems work under the worst-case scenario. In addition, the space is required to be cleaned to a very high level and controls should be put in place to maintain this
3. Fit-out by the IT team – the installation of racks, servers, cabling, and all associated connections as well as testing, and commissioning

None of these can be undertaken in isolation. The key to success is the early planning and coordination of all elements to ensure that all parties are aware of the requirements and interdependencies of their own and others' work.

Increasing energy efficiency

There are two big energy issues for critical sites. The first issue is the power supply required to support the huge load of data equipment found in most critical sites. The second issue is the HVAC required to maintain the temperature of the equipment. In addition, there are a number of other power users such as transformers, UPS systems, and lighting that should be taken into consideration. Areas that can be looked into in order to reduce energy consumption include the following:

- Purchase energy-efficient equipment – higher upfront costs may be offset by potential energy savings over the life cycle of the equipment
- Investigate energy-efficient HVAC options and ensure that they are commissioned and maintained correctly (hot aisle/cold aisle, etc)
- Select energy-efficient backup UPS (dry-wheel kinetic storage or similar) or purchase power from renewable sources
- Ensure that servers are configured correctly to run at peak efficiency
- Consolidate servers and other equipment to reduce equipment load – consider hosting multiple virtual software services on one server
- Activate power management or manually switch off non-critical equipment when not in use
- Identify whether there is potential to generate power on-site
- Undertake a robust commissioning process for new developments or new equipment to optimize operating efficiency
- Align infrastructure with load requirements and ensure adequate backup power provision
- Design floor layout to optimize ventilation and airflow

As governments and organizations intensify their focus on reducing energy demands and greenhouse gas emissions, pressure to improve data center energy efficiency will continue to grow.

4. Critical environment management

Even before you have finished the construction of your new critical site, it is important to start preparing a management program to govern the way your site is operated and maintained. There are three key elements to a robust critical environment management program: the right people, the right processes, and the right relationships. This is discussed in detail in our 2009 white paper, *Critical Care for Critical Environments*.

In addition, many organizations outsource the management of critical sites to third-party service providers that will not immediately have an intimate knowledge of the company, its processes and procedures, or the specific business impact of unplanned downtime. Yet, the ongoing operation, and indeed, the survival of your business, will rest in their hands on a daily basis.

All systems and equipment are designed to operate effectively only within a specified range of environmental conditions. If conditions get out of bounds, then unpredictable and potentially catastrophic results can occur.

Key factors in supporting your service provider to deliver the best results for your business include the following:

- Engaging them well before the operations go live – giving them sufficient time to establish the right platform without the added responsibility of operating the system at the same time
- Linking KPIs directly to organizational critical success (or failure) factors
- Establishing reliable and unambiguous communication structure and procedures
- Escalating recommendations within the organization for review and action
- Explaining to stakeholders the impact of moving or canceling scheduled services
- Discussing critical environment strategy and load growth with service providers
- Providing adequate resources (including opex and capex) to facilitate delivery
- Adhering to established change management and incident management procedures
- Implementing autonomous monitoring of conditions within the critical environment
- Ensuring adequate quality, quantity, and training of human resources

Over time, the intimate knowledge gained by operating critical environments usually swings from the client to the service provider in an outsourced model. Your investment in fostering a collaborative environment is an investment in the long-term reliability of your business.

While you may not eliminate all errors, having the right program in place will maximize reliability and ensure that when incidents do occur, a calculated and measured response will minimize or avoid any further risk to your business operation.

Establishing effective emergency response

Everyone works towards 100% uptime; however, directing staff how to behave in the event of an incident or emergency is important to minimize the impact of a system failure. Having strict protocols in place will ensure that everyone knows what is expected of them and that the appropriately qualified personnel are engaged. Constant communication to all stakeholders, backed by robust documentation, is the key.

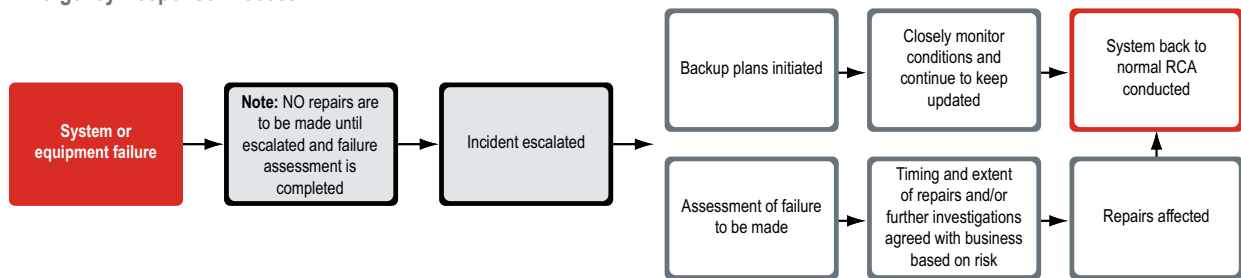
Effective emergency communications will include the following:

- A single point of contact at a centralized facility to put the appropriate action plan into motion
- As many ways as possible to reach all important parties as quickly as possible
- A variety of communication mediums, including phone, web, email, and fax
- Accessible contact lists for employees, third-party support services, critical vendors, and emergency response personnel, including out-of-town contact numbers
- An emergency toll-free number and website for employees and tenants to check in the event of an emergency
- A system to track the progress of communications and requests

Effective documentation should include the following:

- A checklist of items that employees should take with them in the event of an evacuation
- Back-ups of all important programs and information, including one transportable set of back-up disks and all important paperwork off-site
- Copies of emergency response handbooks kept at the homes of the senior critical environment staff
- Best practice contractor management, including full insurance compliance and record keeping
- Configuration management, the discipline of updating inventories of assets

Emergency Response Process



Source: Jones Lang LaSalle

Conclusion

Critical site real estate will continue to be an expensive and complex issue for CRE executives. Identifying or developing your own critical site may seem to be a logical step towards gaining greater control. However, there is significant planning

that must be undertaken before setting out. The four key steps outlined in this paper will help you to align your critical site with your business strategy. Addressing each of these areas will enable you to achieve and maintain sustainable, reliable, and efficient business operations.

Our 2009 report Critical Care for Critical Environments outlines the importance of a rigorous critical environment management program and provides insight into the key elements that must be addressed to ensure maximum business uptime by minimizing error and enhancing response to incidents. Please contact us or visit our website for an electronic copy of this report.

Jones Lang LaSalle pioneered the corporate real estate offering in Asia Pacific. Today, our platform provides unmatched services across a single project, country or regional portfolio. Our commitment to shaping our business around the needs of our clients and delivering on our promises keeps us at the forefront of our industry.

To learn more about delivering effective critical sites, please contact:

Rob Timmermans
+65 6418 8601
robert.timmermans@ap.jll.com

Rajiv Nagrath
+61 2 9220 8321
rajiv.nagrath@ap.jll.com

Dave Colverson
+65 6507 4726
dave.colverson@ap.jll.com

