# Paya Lebar Quarter

## Climate Change Adaptation & Resilience Plan

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Paya Lebar Quarter is the next chapter in Lendlease's global focus on major urban regeneration projects, transforming an underutilised urban area into a vibrant, connected community.


Image courtesy of DP Architects

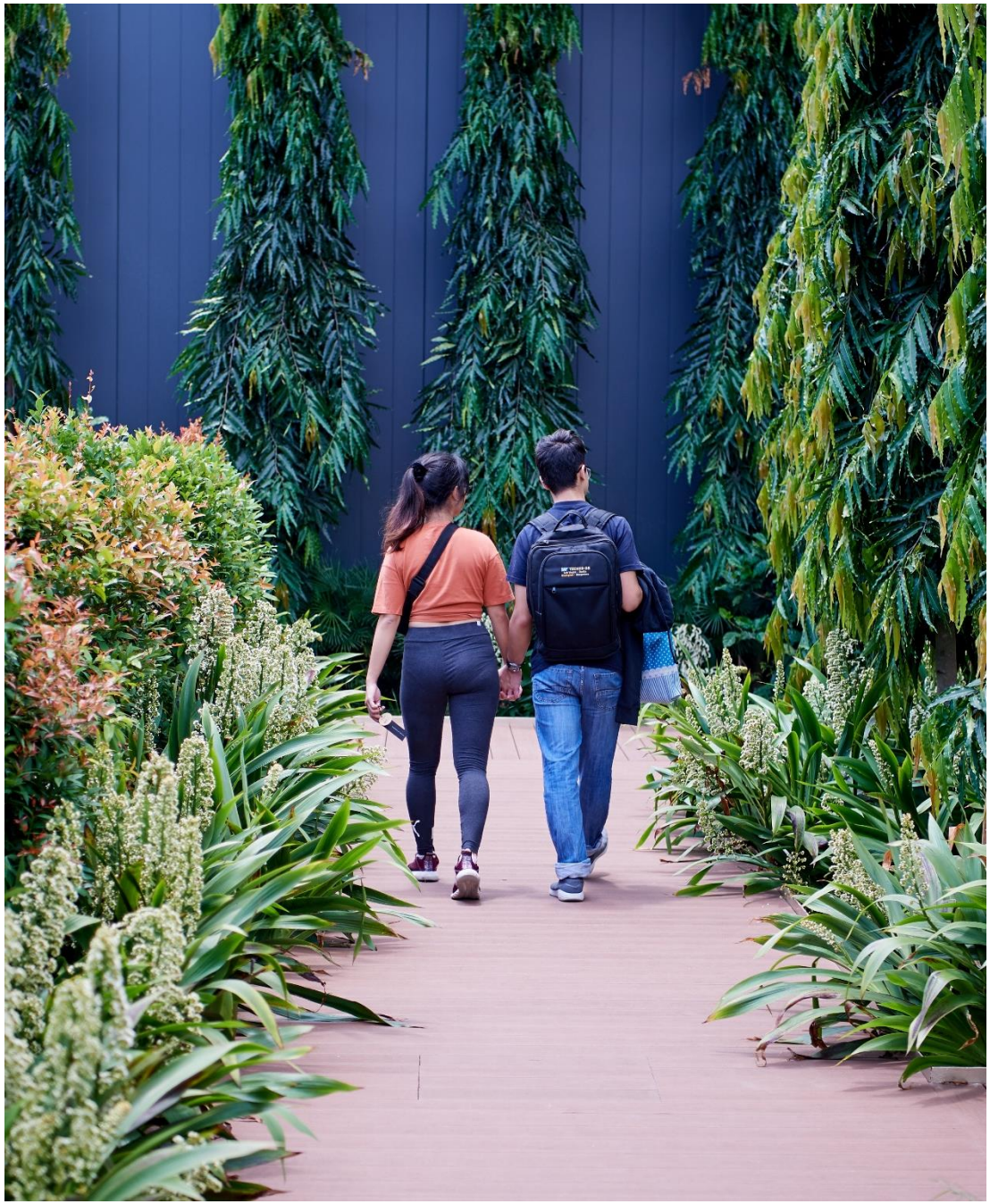
Aspiring to be Singapore's most progressive new city precinct, Paya Lebar Quarter has been consciously built with a strong focus on sustainability and community resilience.

Centrally located within the culture rich neighbourhood of Paya Lebar, the mixed-use precinct comprises three modern Grade A office towers, three residential apartment towers, a retail mall and is surrounded by a lush expanse of greenery and landscape. With direct integration to Paya Lebar MRT station, the precinct offers seamless connectivity to the rest of the city, helping to ensure the city's sustainable future growth.

The three commercial towers of PLQ Workplace provide approximately 83,000m$^2$ of prime office space, designed to optimise the health and wellbeing of 10,000 working executives.

PLQ Mall features a myriad of diverse shopping, dining and entertainment experiences for shoppers across its 32,000m$^2$ of retail space.

Park Place Residences comprise three residential towers, totalling 429 units of premier apartments.



# introduction

## Context and background

Climate change represents one of the greatest challenges facing humanity in the present century. There is unequivocal evidence that human activity, in particular the burning of fossil fuels, is causing our planet to warm and changing our climate.

The Intergovernmental Panel on Climate Change (IPCC) reported that anthropogenic warming had reached 1°C above pre-industrial levels in 2017, the impacts of which are already observed globally through changing weather patterns, more frequent and intense storms, heatwaves and other extreme weather events.

This trend is expected to continue into the late century with climate change impacts projected to increase in both frequency and magnitude.

To avoid the much larger and more severe impacts of climate change, there is an urgent need for coordinated action to not only reduce global greenhouse gas emissions, but also increase the adaptive capacity and resilience of our built environment and communities.

## Our commitment to climate action

Lendlease has developed its new Sustainability Framework in response to the growing pressure that climate change has placed on our planet and people. Our new framework responds to the need to plan for future generations by integrating an environmental and social focus lens into every part of our business.

At Lendlease, we understand that our work plays a significant role in creating vibrant, socially inclusive communities that are adaptive and resilient to the impacts of climate change and valued by the people who live, work and play there.

Lendlease has undertaken a climate risk analysis of Paya Lebar Quarter to inform its design and support planning around the key climate risks that are likely to impact the development and its community.

This Climate Change Adaptation and Resilience Plan presents the methodology and findings of our climate risk analysis and highlights the key strategies and features of Paya Lebar Quarter that reduce its vulnerability to climate change impacts and increase the adaptive capacity and resilience of its community.

# climate risk analysis

**Understanding the likelihood and consequence of future climate change events enables the project team to identify the areas of the development that are sensitive to climate change impacts.**

## Taskforce on Climate-related Financial Disclosure (TCFD)

Responding to the impacts of climate change requires a systemic, risk-based approach. The recommendations of the Taskforce on Climate-related Financial Disclosure (TCFD) seeks to provide a consistent framework for organisations to assess and disclose their climate-related financial risk and opportunities.

The TCFD is underpinned a scenario planning process that sets to build resilience by facilitating a forward thinking, strategic approach to managing the physical and transitional risks associated with climate change.

Lendlease has endorsed the recommendations of the TCFD and in 2018 commenced analysis into the impact that alternative climate scenarios would have on our business strategy, assets and operations. We established four planning scenarios based on the plausible emission trajectories defined by the IPCC Representative Concentration Pathways (RCPs).

Our *Resignation* scenario, which is consistent with a RCP8.5 high emissions trajectory, represents a world where no climate action is taken. We use this scenario to assess worse case physical risks across our operations and supply chain.

## Physical Risk Assessment

Physical risks pose the greatest threat in a *Resignation* scenario where climate change impacts are most severe.

The assessment of physical risk is considered in terms of the following two types of physical impact:

**Acute impacts** - such as cyclone, tornado, wildfire and flooding that are highly localised and produce immediate, severe direct impact to our developments.

**Chronic impacts** - such as water scarcity, temperature increase and sea level rise which impact our developments incrementally over a longer time period.

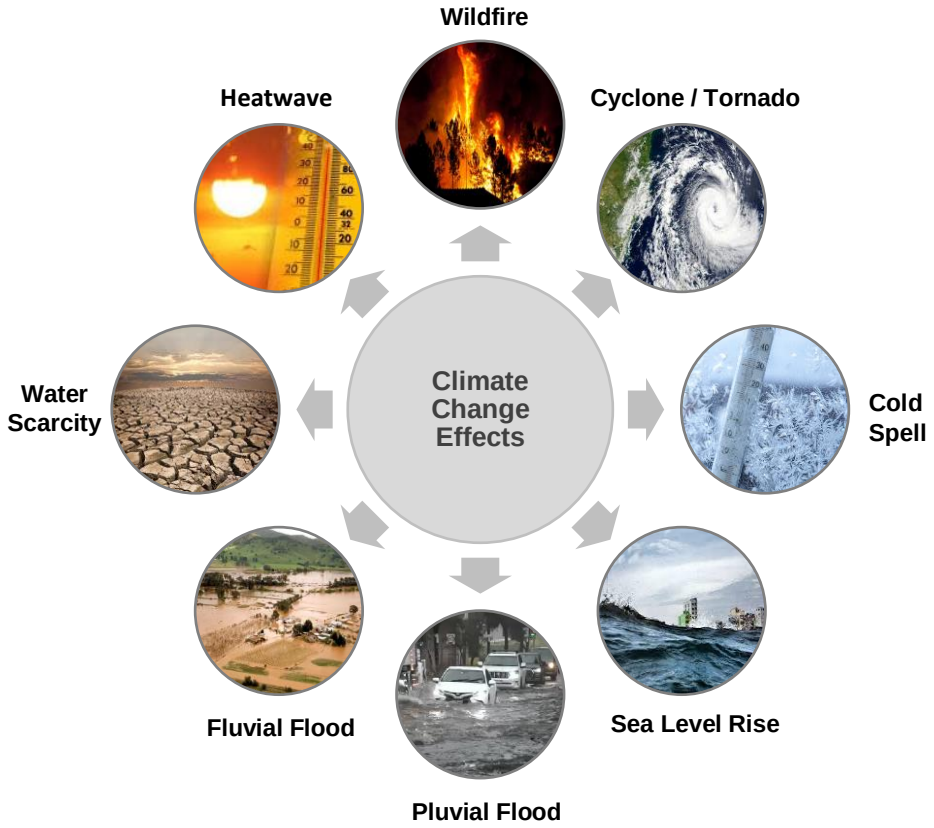



Figure 1 The Acute and chronic physical impacts of climate change assessed in our climate risk analysis

## Methodology

The climate change risk assessment involves analysis of the likelihood and consequence of a climate change risk event, followed by response to the impact.

The following sections outline the methodology applied to identify and evaluate the level of risk associated with climate change impacts. The risk assessment methodology applied is in accordance with ISO 31000:2018 *Risk Management – Guidelines* and in accordance with the Lendlease Group Risk Management Framework.

## Risk Identification

Climate change risks have been identified in consultation with a broad range of stakeholders through several workshops.

Participants identified the potential ways that climate change can impact the organisation and developments in the context of the following areas:

- Operations
- Markets
- Supply chain
- Products and capabilities
- Reputation and brand

Lendlease maintains a register of risk register that has been developed over time and will be periodically reviewed and updated based on lessons learnt, research and new findings.

## Likelihood of Risk

The physical impacts of climate change are site specific and determined by the asset's geographic location.

The first stage of the risk analysis is to screen the development location to assess exposure of the asset against the climate change effects shown in Figure 1.

This is achieved by reviewing regional climate change projections and overlaying the asset location with climate models.

Climate change projections are viewed across multiple time periods to understand the likelihood of risk now and in the future as it relates to the anticipated service life of the asset.

Likelihood is scored in accordance with the Lendlease Risk Management Framework likelihood rating criteria.

## Consequence of Risk

The second stage of the analysis is to evaluate the consequence (impact) of the identified climate change risk event.

The impact score is determined accordance with the Lendlease Risk Management Framework consequence rating criteria and holistically considers the potential direct and indirect environmental, social and economic impacts the risk event to both the development and organisation.

| | | Impact | | | | |
|---|---|---|---|---|---|---|
| | | Very Small | Small | Medium | Large | Very Large |
| Likelihood | Very High | Minor | Moderate | Significant | Significant | Critical |
| | High | Minor | Minor | Moderate | Significant | Significant |
| | Medium | Minor | Minor | Moderate | Moderate | Significant |
| | Low | Negligible | Minor | Minor | Minor | Moderate |
| | Very Low | Negligible | Negligible | Minor | Minor | Minor |

Table 1 Lendlease Risk Management Framework - Risk Rating Matrix

| Risk Rating | Description & Required Response |
|---|---|
| Critical | These risks demand the most attention and current design practice cannot be simply accepted as part of the solution. |
| Significant | These risks demand the most attention and current design practice cannot be simply accepted as part of the solution. |
| Moderate | These risks are the most severe that current design practice can be accepted but they will be the responsibility of the most senior management and reported upon at the executive level. |
| Minor | These risks can be expected to form part of current design practice but they will be explicitly maintained under review and reported upon at senior management level. |
| Negligible | These risks will be maintained under review but it is expected that existing controls will be sufficient and no further action will be required. |

Table 2 Lendlease Risk Management Framework – Risk Tolerance

## Creating the risk priorities

The level of risk priority is evaluated as a function of the likelihood and consequence in accordance with the risk rating matrix shown in Figure 2.

Understanding the likelihood and consequence of a climate risk enables the project team to identify the areas of the development that are sensitive to climate change impacts to then design and plan around the key priority risks.

The key priority risks that were identified as "critical" or "significant" for Paya Lebar Quarter have been addressed in the Climate Adaptation Plan

# climate change projections

**To predict the effects of climate change, we must first forecast greenhouse gas emissions then simulate the possible outcomes that alternative emission scenarios may have on our future climate.**

## A changing climate

Our climate is constantly changing - natural cycles bring hot weather and drought followed by cooler weather and increased rainfall. Human activity however, in particular the burning of fossil fuels, is releasing more greenhouse gases in our atmosphere causing our climate to change.

The increase of greenhouse gases in our atmosphere creates the primary climate effects of increased temperatures, rainfall and sea-levels. These changes then stimulate the secondary effects of drought, flood, cyclone and other extreme weather events that are being observed globally.

To predict the effects of climate change, we must first forecast greenhouse gas emissions then simulate the possible outcomes that alternative emission scenarios may have on our future climate.

## Predicting climate effects

The IPCC Fifth Assessment Report defined four greenhouse gas emission scenarios, called Representative Concentration Pathways (RCP), that can be used in climate scenario modelling. Each RCP represents a specific emissions pathway characterized by different levels of greenhouse gas emissions, air pollution and land-use scenarios consistent with socio-economic predictions for the future.

Characteristics of the four RCPs are outlined in Table 3. Our climate risk assessment adopts climate projects under the RCP8.5 high emissions trajectory to assess the potential worst-case impacts that climate change will have on the development.

The following sections outline the climate trends occurring across Singapore, and projections for the climate variables assessed.

| RCP | Characteristics | Description |
|---|---|---|
| 2.6 | 490 $CO_2$ ppm, 1.5 ˚C Temp anomaly | RCP2.6 is representative of scenarios in the literature that lead to very low greenhouse gas concentration levels. It is a 'peak-and-decline" scenario in which greenhouse gases and radiative forcing is reduced substantially, over time (Van Vuuren et. al, 2011) |
| 4.5 | 650 $CO_2$ ppm, 2.4 ˚C Temp anomaly | RCP4.5 is a stabilisation scenario in which total radiative forcing is stabilized shortly after 2100, without overshooting the long-run radiative forcing target level. |
| 6 | 850 $CO_2$ ppm, 3.0 ˚C Temp anomaly | RCP6 is a stabilisation scenario in which total radiative forcing is stabilized shortly after 2100, without overshoot, by the application of a range of technologies and strategies for reducing greenhouse gas emissions. |
| 8.5 | 1370 $CO_2$ ppm, 4.9 ˚C Temp anomaly | RCP8.5 is characterised by increasing greenhouse gas emissions over time, representative of scenarios in the literature that lead to high greenhouse gas concentration levels. |

Table 3 Characteristics of RCP scenarios. RCP8.5 is used to assess the physical impacts of climate change.

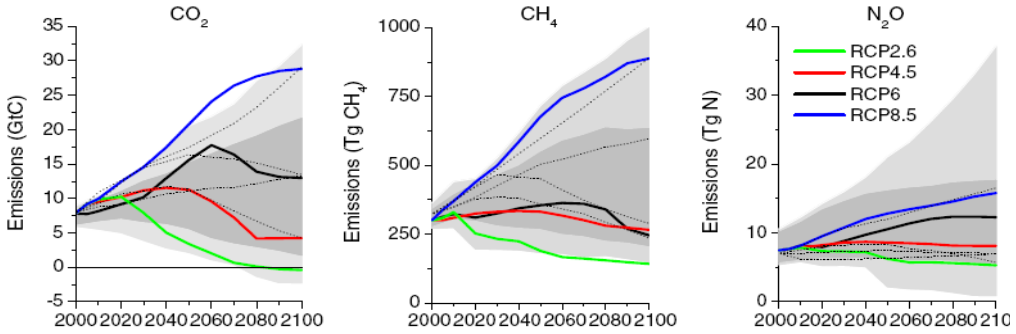



Figure 2 Trajectory of main greenhouse gases for each RCP (Van Vuuren et al. 2011)

## Changing Temperatures

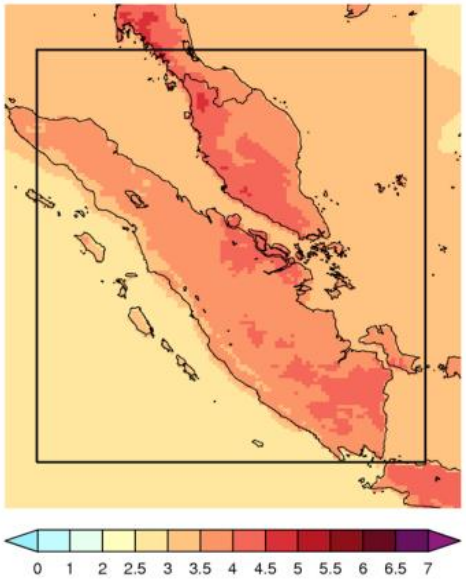



Figure 3 Changes in average November – January air temperature by 2080 under RCP8.5 (CCRS)

Increases in minimum, maximum and mean temperatures are projected across Singapore over the next 100 years. The mean daily temperature is projected to increase by approximately 4°C under a RCP8.5 scenario for the end century period (2070-2099) relative to a reference period of 1995 baseline.

Hot days (>34.1°C) in February-May will increase dramatically to more than 100 additional warm spells each year under a RCP8.5 scenario. Warmer nights above 26.2°C are also expected to occur during June-September by mid-21st century.

## Changing Precipitation

Analysis of annual mean rainfall change over Singapore shows considerable variation amongst climate models, ranging from positive to negative change, independent of the RCP.

In all cases, long term projections indicate Singapore's annual average rainfall will continue to be dominated by natural variability with increasing intensity and frequency of heavy rainfall events as the world warms. This is consistent with our current understanding that the frequency and intensity of heavy rain events increase in a warmer atmosphere with a higher water vapor content.

On a seasonal basis, the contrast between the wetter and drier months is projected to become more pronounced. The models generally project an upward trend in seasonal mean rainfall during the wet season of November to January, as well as reduced precipitation in the dry months of

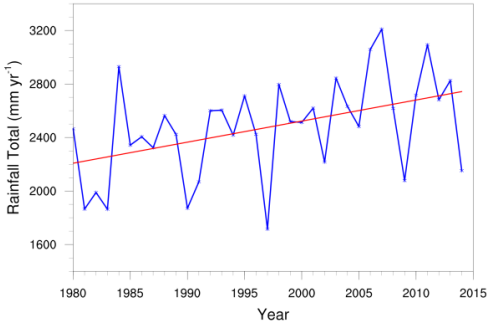



Figure 4 Plot of annual rainfall totals in Singapore show an upward trend of 15.7mm per year, based on linear fit from 1980 to 2014, CCRS.

February, and June through to September.

## Sea Level Rise

Sea level change represents the combination of a complex range of processes that vary by time and location. The projections using data from the CMIP5 suggest trends in mean sea level far greater than those already experienced in the last few decades.

Rates of sea level rise due to glacial melt and ice sheet melt are somewhat higher for Singapore due to its position near the equator.

Under the RCP8.5 scenario, Singapore is projected to experience sea level rise of 0.25m by 2050 and 0.73m by 2100.

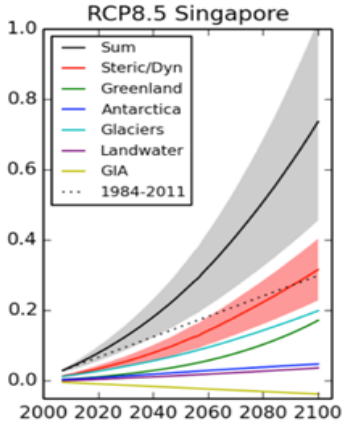



Figure 5 Sea level rise projections relative to a 1995 baseline (CCRS)

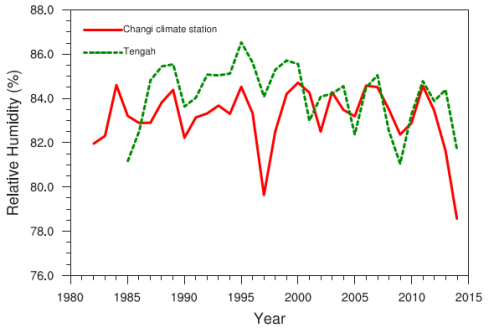
## Sea Surface Temperature

Sea surface temperatures over the South China Sea have increased significantly over the past decade, with a peak between the early 1970s and later 1990s.

Sea surface temperatures are expected to continue rising, posing significant threat to marine species around the coast.

## Changing Relative Humidity

All studies project statically significant negative changes in Singapore's average relative humidity under both RCP scenarios through the century (Figure 10). Overall, relative humidity is projected to decline by 2.8% and 4.6% at the end of the century with respect to the reference period under RCP4.5 and RCP8.5 scenarios (i.e. decrease from 83.0% in 1980-2009 to 79.2% (RCP8.5)




and 80.7% (RCP4.5) in 2070-2099).

Figure 6 Annual mean relative humidity recorded 1982-2014 (CCRS)

## Severe wind

Singapore will continue to be dominated by the northeast and southwest monsoons. By the end of the century, there are no substantial changes in wind direction but there is some indication of increasing wind speeds of 5-10% during the northeast monsoon season under RCP8.5.

## Climate change projections summary

The following table summarises the climate change projections used to inform the climate change risk assessment. The risk assessment considers two timeframes, 2070 and 2100, which correspond with the anticipated service life of the development.

All climate change projections presented are measured relative to the baseline year 1995 in accordance with the recommendations of the IPCC Fifth Assessment Report.

| Climate Variable | 1995 (Baseline) | RCP4.5 | | RCP8.5 | |
|---|---|---|---|---|---|
| | | 2070 | 2100 | 2070 | 2100 |
| Mean daily temperature | 27.4°C | +1.4°C | +2.7°C | +2.9°C | +4.6°C |
| Mean maximum temperature - Annual | 31.8°C | +1.5°C | +2.8°C | +3.1°C | +4.9°C |
| No. of warm days in February-May above 34.1°C | 25 days | 74 days | 108 days | 105 days | ALL days |
| Annual average rainfall (mm/yr) | 2488.4mm | -12.4% | +10.3% | -17.2% | +26.8% |
| Northeast monsoon rainfall (mm/mth) | 261.8mm | -13.6% | +42.9% | -23.1% | +67.5% |
| Southwest monsoon rainfall (mm/mth) | 174.6mm | -12.4% | +12.3% | -30.3% | +1.2% |
| February rainfall | 142.1mm | -82.4% | 23.9% | -83.2% | 16.5% |
| % contribution to annual rainfall from very wet days (as defined by historical 95th percentile value) | 22.8% | 21.1% | 35.3% | 21.5% | 44.1% |
| No. of days with WBT above 27.7°C | 37 days | 280 days | 329 days | 313 days | 357 days |
| Mean sea level | 0 (baseline) | +0.25m | +0.60 m | +0.35m | +0.76 m |
| 10m wind | No significant change in prevailing wind directions. Some indication of increased wind speeds under RCP8.5 during the northeast monsoon season. | | | | |

Table 4 Summary of climate change projections for the region

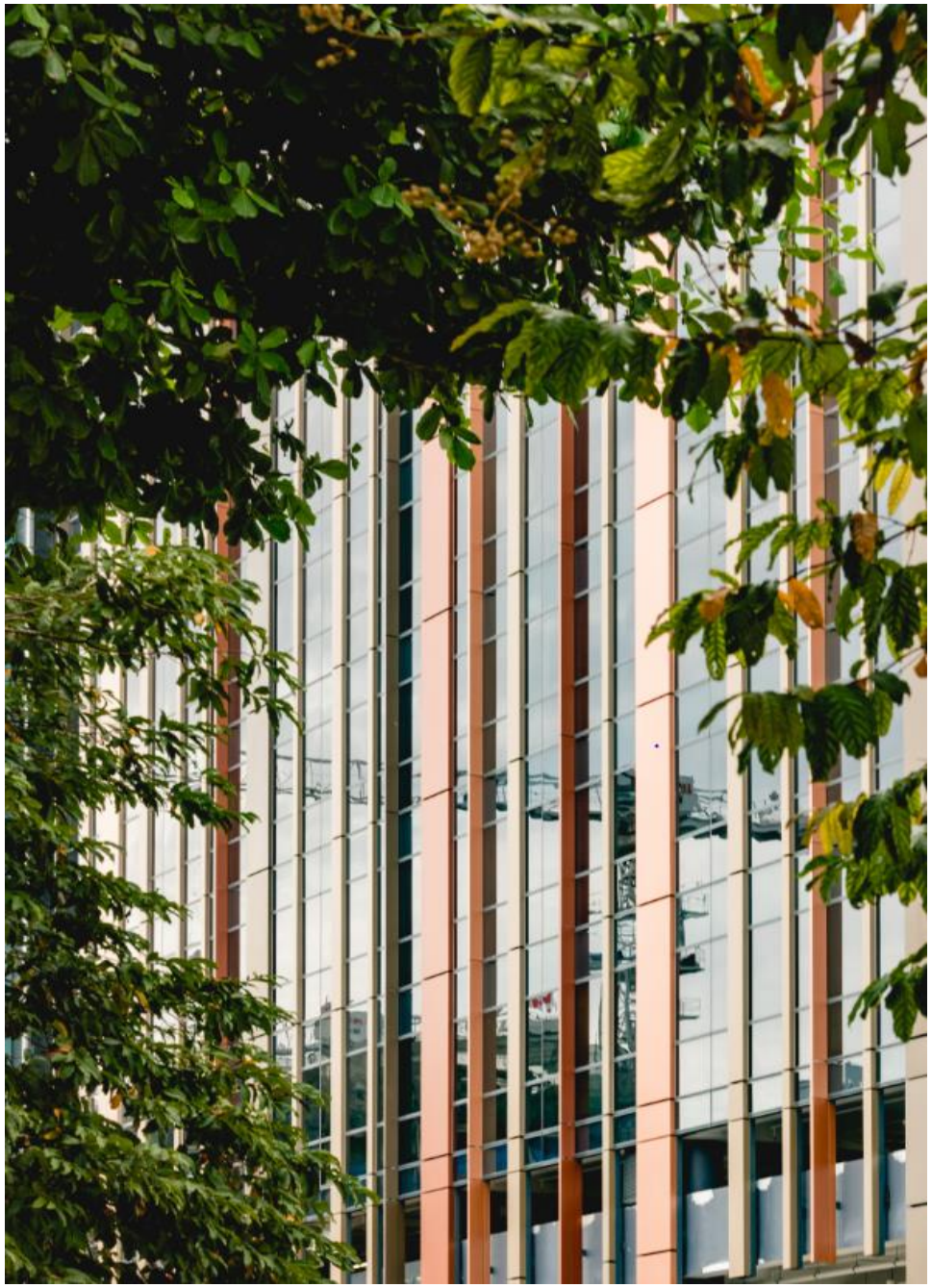


Image courtesy of DP Architects

# risk analysis results

Climate change adaptation and resilience planning workshops were held over two days and involved a broad range of stakeholders. The focus of the workshops were to address the key physical risks of climate change that are most likely to impact Paya Lebar Quarter in the near and long-term future. The key climate change impacts addressed informed by project climate change data included heatwave, urban flood and wildfire. The following 33 risk scenarios were identified as having the highest potential to cause direct and indirect environmental, social and economic impact.

### Heatwave

With increased mean temperature and heatwaves across Singapore

1. Heatwave leads to restricted work hours for outdoor work (e.g. landscape maintenance, building envelope cleaning) resulting in increased maintenance costs and reduced precinct amenity.
2. Heatwave leads to accelerated degradation of materials and services leading to increased maintenance requirements (e.g. carbonation of concrete, softening of pavements).
3. Increasing air and surface temperatures of external spaces leads to health and safety risks of visitors/residents/tenants e.g. heat stress and surface burns.
4. Increasing air and surface temperatures of external spaces leads to negative customer/stakeholder experience.
5. HVAC systems / passive design features are not adequate leading to occupant discomfort.
6. Increased utility / operational costs / cost of living due to greater cooling requirements.
7. Higher temperatures increase spatial demand for air conditioning plant in the future.
8. Increased energy demand decreases ability of asset to maintain energy efficiency / sustainability ratings.
9. Decrease in asset network capacity causing power outages and disruption to essential services.
10. Substation temperatures exceed design criteria leading to substation failure / outages.
11. Retailers experience a decline in footfall due to heatwave in the city resulting less people travelling to the precinct.
12. Retailers with external dining spaces experience declining trade due to external spaces becoming too hot.
13. Higher temperatures amplify odours from waste bins leading to a negative stakeholder experience.
14. Increased temperatures / drying out of soil increase subsidence risk, foundation cracking.
15. Earthing and bonding affected by increased temperatures / drying out of soil increasing health and safety risks.
16. Increases in relative humidity may result in the build-up of mould and condensation within buildings leading to increased maintenance requirements.
17. Changing climates may lead to environment becoming more suitable for water-borne diseases exposing building stakeholders to increased health and safety risks.

### Urban Flood

With rising sea levels and increased intensity of extreme rainfall and inundations throughout Singapore

18. Local flooding disrupts access and egress of people to and from the asset.
19. Local flooding disrupts delivery of goods and services and waste removal to the asset.
20. Increased number of flood events impacting the asset leads to increasing costs / access to insurance.
21. Emergency access, egress and services (i.e. fire systems such as hydrants) is impeded by flood waters.
22. Inundation of essential plant and equipment resulting in increased maintenance / replacement costs e.g. substation, transformers, lifts, escalators, fire escape etc.
23. Drainage systems (civil and roof) unable to cope with increased rainfall intensity.
24. Increased frequency and severity of extreme rainfall events increases ground water levels leading to bunding and waterproofing failures.
25. Increased frequency and severity of extreme rainfall events leading to flooding or saturation of embankments and ground conditions which results in subsidence.
26. Increase in rainfall increases slip hazards in areas not designed for water ingress e.g. building entries.

### Wildfire

Singapore can be affected by wildfires in neighbouring countries affecting its air quality

27. Reduced air quality due to more frequent wildfires leads to health and safety risks of visitors/residents/tenants e.g. health complications due to increased air-borne particulates.
28. Reduced air quality due to more frequent wildfires decreases capacity of assets to maintain indoor air quality at acceptable levels.
29. Reduced air quality leads to restricted work hours for outdoor staff (e.g. landscape maintenance, building envelope cleaning) resulting in increased maintenance costs and reduced precinct amenity.
30. Increased frequency and severity of wildfires leads to increased HVAC maintenance and air filtration media replacement / upgrades.
31. Retailers with external dining spaces experience declining trade due to high levels of air pollution in spaces open to ambient air
32. Retailers experience a decline in footfall due to poor air quality in the city resulting in less people travelling to the precinct.
33. More frequent air quality issues result in increased spatial demand for air conditioning filtration systems in the future.

## Risk Diagram

The diagram below summarises the inherent and residual risk assessment of the 33 climate-risk scenarios identified. Risk scenarios identified as “critical” or “significant” are the key priority risks addressed within this plan.

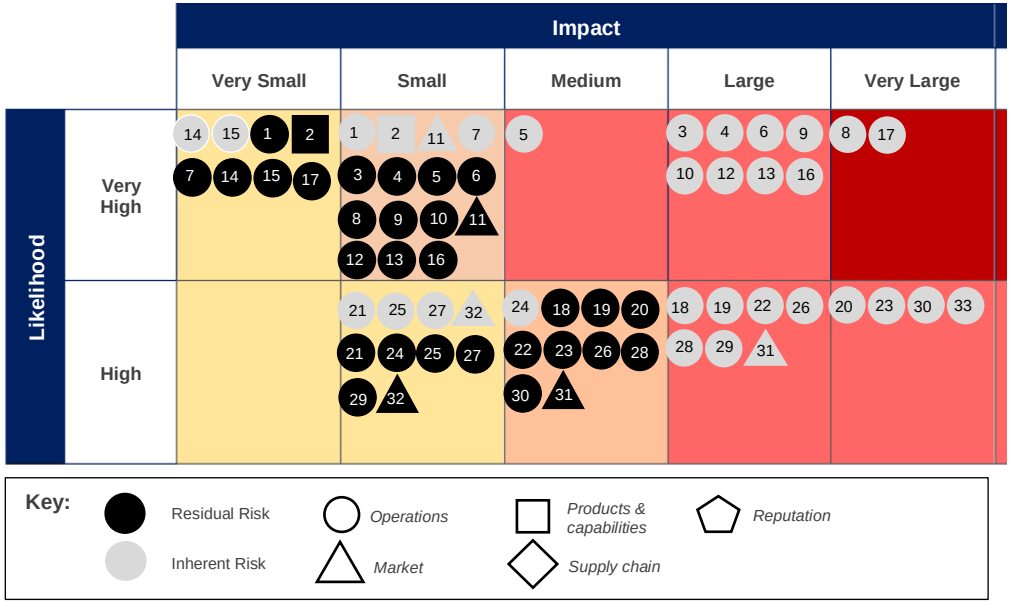



Figure 7 Inherent and residual risk rating of the climate-risk scenarios identified

# climate adaptation plan

**Our work plays a significant role in creating communities that are adaptive and resilient to the impacts of climate change. The built environment has a powerful impact on the adaptive capacity of the community it serves – focus must be given to initiatives that make communities safer, more connected, and better prepared for natural hazards and emergencies.**

The future adaptation and resilience of our developments consists of two main elements – the built environment and its community. It is the combination of these two elements and how they interact that will create good levels of resilience.

The precincts and communities that will bounce back from future climate change impacts will be those that have built a strong sense of ownership and belonging. Building that sense of belonging at the start of the creation of a new community is one of the fundamentals to future resilience.

Paya Lebar Quarter has been consciously built with a strong focus on establishing a connected community and creating a collection of climate resilient buildings and infrastructure.

The following sections highlight the key design features of Paya Lebar Quarter that future-proof the precinct's buildings and infrastructure against the impacts of climate change and the initiatives that connect residents, workers and visitors to create a strong sense of community.

# climate adaptation and resilience highlights

**Key:** Built Environment  Community Resilience Initiatives

### Solar Shading

PLQ Plaza features a durable polytetrafluoroethylene (PTFE) awning structure to provide solar shading and shelter from extreme weather events.

### Renewable Energy

A rooftop solar photovoltaic system with an annual generation capacity of 240,000kWh has been planned for installation on PLQ Mall

### Student Engagement

Proactive student engagement to develop the passion and skills of future generation in areas including science, technology, engineering and mathematics.

### Access and Egress

Covered and elevated pedestrian link bridges provide access between all assets including direct connection to PLQ MRT, enabling safe and sheltered egress during extreme weather conditoons

### Biophilic Design

Sky gardens, vertical gardens and green spaces of the plaza and promenades improve outdoor air quality and reduce urban heat island impacts on precinct residents and visitors

### Connectivity

The precinct is directly integrated with the dual line Paya Lebar MRT Interchange, providing convenient access and egress and seamless connectivity to the rest of the city.

### Flood Mitigation

Approx. 10,000m$^2$ of softscape area comprising raingardens, drainage cells and stormwater detention tanks filter stormwater and minimise peak flows before discharging off-site.

### Indoor Air Quality

MERV14 filtration installed to all office and retail assets to maintain high indoor environmental air quality. Adequate space provision to enable potential retrofit of carbon filters.

### Skills and Development

PLQ participates in SkillsFuture Learning *Neighbourhood.* PLQ's Learning Café offers short, bite-sized learning activities, talks and workshops available to residents and the public.

### Urban Heat Island

Biophilic design, green spaces, a tropical buffer to the perimeter of the precinct and high albedo paving surfaces mitigate the urban heat island effect.

### Flood Mitigation

Local stormwater infrastructure upgraded to improve capacity and reduce site overflow and potential downstream flash flooding impacts.

### Community Connections

Meet Your Neighbour events facilitate interaction between residents, workers and visitors to foster relationships and create a strong sense of community.

### Thermal Autonomy

Building facades are designed to exceed compliance standard for envelope thermal transfer value (ETTV) providing higher levels of thermal autonomy.

### Climate Awareness

Increased awareness and education about climate change provided to the PLQ community, starting with the release of this Climate Change Adaptation and Resilience Plan.

# built environment initiatives

Our built environment must be designed not just for today's climate, but for the future climate as well. Often this will take the design beyond current minimum compliance, however this is essential in maintaining the resilience of our developments well into the future.

The Paya Lebar Quarter features a number of design features that respond to the key priority risk; these are described in the following sections.

## Heatwaves

A palette of tree plantings comprising urban tree canopies and understory gardens are strategically placed to provide solar shading to pedestrian areas and to reduce urban heat island effects. Additionally, outdoor furniture is primarily positioned beneath shaded areas and utilise materials with low conductivity to prevent contact burn.

Precinct walkways feature a selection of high albedo pavements of predominantly light grey and off-white stone to reflect solar radiation to reduce urban heat island effects.

Building facades have been designed above industry standard for improved envelope Thermal Transfer Values (ETTV) to maximise building thermal autonomy. High-performance double glazing units have been provided to residential buildings to maximise indoor comfort.

Precast elements to the façade of PLQ Mall are designed with a thermal gap between the external cladding to minimise thermal bridging and ensure humidity and moisture control. This minimises the potential for accelerated carbonation of the concrete structure as a result of more extreme heat, increased carbon dioxide levels and ambient moisture levels.

## Urban Flood

Paya Lebar Quarter incorporates Active Beautiful Clean (ABC) Waters design principles to seamlessly integrate natural flood prevention mechanisms into the urban landscape.

The precinct features approximately 10,000m$^2$ of softscape area comprising raingardens and associated drainage cells. The permeable areas in conjunction with five stormwater detention tanks provide filtration to improve water quality and reduce peak-run off flows and off-site discharge rates, helping to minimise the impact of extreme rainfall on surrounding stormwater infrastructure and communities.

An additional buffer is provided to all buildings within the precinct to mitigate flood risk. Threshold levels for all buildings, carpark and basement entrances have been elevated to a minimum 1.0m above the ground plane to prevent flood water ingress.

Covered and elevated pedestrian link bridges provide access between all assets

including direct connection to Paya Lebar MRT. Elevated walkways allow for safe egress should the precinct be subjected to localised flooding or inclement / extreme weather events.

## Wildfire

More frequent and intense wildfires within the neighbouring regions is likely to increase the risk of poor air quality and smoke penetration into buildings within the precinct. This risk has the potential to negatively impact human health and decrease occupant satisfaction and comfort.

All supply air to buildings within the precinct are pre-cooled with an initial filtration stage, followed by MERV14 filtration and then final air handling unit filtration.

Additional space allowance has been incorporated into the design to enable future retrofits to HVAC systems that will enable installation of a further level of filtration (carbon filters) if necessary to maintain indoor air quality at acceptable levels.

All retailers within the Paya Lebar Quarter precinct are required to have installed "press to open" controls to all external automatic doors. This enables retailers to effectively prevent outside air from entering during days of poor air quality to maintain indoor comfort. Indoor environment quality monitoring is required at a minimum of once every three years to ensure indoor air quality is being appropriately managed to a high standard and to maintain Green Mark certification.

# community resilience initiatives

A community thrives when its people are constantly engaging with each other through conversation, mutual interests and sharing in fun activities.

When creating a new community like Paya Lebar Quarter, it is essential to establish frameworks and systems that foster interaction and connections in order to create good levels of community interdependency and to build resilience.

A number of community initiatives are provided at Paya Lebar Quarter to help foster community connections; these are described in the following sections.

## A place to connect

Paya Lebar Quarter's Plaza functions as a town centre, offering a vibrant, open space for the community to meet and mingle. The precinct includes public facilities such as play areas for the community to enjoy.

Residents to Paya Lebar Quarter are invited to Meet Your Neighbour events which encourage residents to break the ice and gives a chance for the community to get to know their neighbours and develop relationships.

## A place to learn

Lendlease is a committed learning partner of a secondary school in the local community with structured programs. It is also developing a learning portal "People Places Planet" experience portal that shares its approach towards placemaking and sustainability which is accessible by educators, students, industry peers or anyone with an interesting for the knowledge. Topics include Urban Heat Island effect mitigation, energy efficiency and climate risk mitigation.

Paya Lebar Quarter opened its doors, providing a sustainability corner educating the public about waste and how everyone can play a part leading a zero waste lifestyle and will be providing bite-sized learning activities, talks and workshops available to the public.

This is the first of many student engagements aimed at developing the skills and passion of future generations in areas such as science, technology, engineering and mathematics.

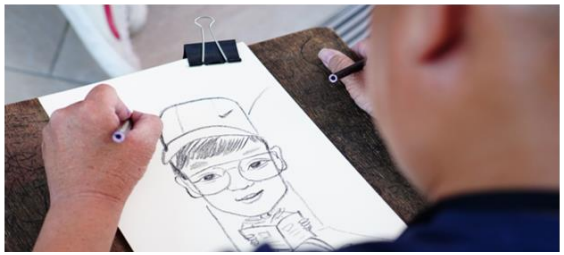
## Community Interdependency

The PLQ Workplace app integrates all tenant and visitor services through a single platform, tailored to address the occupants' needs in a future grade workplace.

Residents and tenants can stay connected to PLQ's precinct ecosystem via this mobile app, which provides key updates, resources and exclusive offers.

## Climate Awareness

Increasing awareness starts with the release of this Climate Change Adaptation and Resilience Plan. We hope this report will start the conversation around the topic of climate change and what we can do as a community to be better prepared.

# looking ahead

Lendlease's vision to create the best places is underpinned by its commitment to sustainability as a core operating principle. Lendlease acknowledges that human-induced climate change is occurring and acknowledge the basic science supporting this. For several years, Lendlease has identified climate change as a material risk to creating the best places and continues to work with wider industry and government partners to develop plans to respond to the physical risks of climate change on our business.

We also acknowledge the dynamic and transitional risks and opportunities of decarbonising society in line with a 1.5 Degree global warming target, including policy fluctuations, market movements, technology evolution and reputational impacts. We recognise these risks and opportunities may differ by region.

Cities will need to respond to both the physical risks of climate change, as well as the transitional risks and opportunities of a decarbonised society and the property sector will play a vital role in both resiliency and decarbonisation. New and existing buildings need to be resilient to short and long-term climate change impacts, as well as maximise energy efficiency and onsite renewable energy, to reduce the burden on decarbonising the city's electricity grid.

Working with city partners, investors and our supply chain we believe that the property sector can take a leading role in demonstrating leadership through creating places that are future ready for both the physical impacts of climate change and the need for city level decarbonisation.

Sharing our approach to assessing and managing climate related risks and opportunities, as demonstrated in this report, is one of the key steps we are taking to collaborate with our city partners, investors, competitors and our supply chain.

# ABOUT LENDLEASE

## The best places begin with the experience.

Lendlease is a leading international property and infrastructure group with operations in Australia, Asia, Europe and the Americas.

We create experiential destinations, from Singapore to Sydney, New York to London. We have been creating retail destinations for more than 40 years that change the way people live, work and play. We go beyond building, management and leasing – to reach people through experiences. We also forge strong relationships that connect communities to retail centres via the infrastructure we create.

Barangaroo South, Australia

Melbourne Quarter, Australia

International Quarter London, United Kingdom

JEM, Singapore

# thank you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