



## New Sydney Fish Market, The Bays

Ecologically Sustainable Development Report  
For Concept and Stage 1 Works & Stage 2 Main Works  
SSD 8924 & SSD 8925

Prepared for:

Infrastructure NSW  
c/o – 3XN Architects

Date:  
26 September 2019

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## Revision

REVISION	DATE	COMMENT	APPROVED BY
1	21/2/2018	Preliminary Draft	ALK
2	22/2/2018	Issued for Comment	ALK
3	23/2/2018	For Issue	ALK
4	15/08/2018	SSD – DA Issue	ALK
5	31/08/2018	SSD – DA Issue	ALK
6	11/09/2018	SSD – DA Issue	ALK
7	06/11/2018	SSD – DA Issue	ALK
8	01/04/2019	SSD – DA Issue	ALK
9	26/09/2019	SSD – DA Issue	ALK

REVISION

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# The New Sydney Fish Market Masterplan

## 1 Executive Summary

This Ecological Sustainable Development Report has been prepared for Infrastructure NSW (iNSW) c/ 3XN Architects for the proposed new Sydney Fish Market Development at 1B Bridge Rd, Glebe, NSW 2037. This report is intended to provide an overview of the proposed ecologically sustainable development (ESD) principles and efficiency measures and is intended to form part of the Environmental Impact Statement (EIS) for the State Significant Development Application. This is a direct design response to the ESD component of the Secretary's Environmental Assessment Requirements (SEARs), and NSW Environmental Planning and Assessment Regulation 2000, as required by the NSW Environmental Planning and Assessment Act 1979 No 203.

The new Sydney Fish Market development is proposed to be a world leading example of sustainable design, construction and operation, by incorporating an exceptional level of passive and active initiatives.

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers);
- Detail regarding specific ecological sustainable development initiatives through all phases of the project;
- Demonstration of assessment against a suitably accredited rating scheme to meet industry best practice; and
- Initiatives that will minimise the consumption of material resources, water (including water sensitive urban design) and energy.

Information contained within this report has been prepared in direct response to:

- The Secretary's Environmental Assessment Requirements (SEARs);
- The NSW Environmental Planning and Assessment Act 1979;
- The NSW Environmental Planning and Assessment Regulation 2000;
- The Bays Precinct Urban Transformation Plan (2015);
- Rozelle and Blackwattle Bays Maritime Precincts - Master Plan (2002);
- City of Sydney Council LEP (2012);
- City of Sydney Council DCP (2012); and

In coordination with the above, the project will implement a number of sustainable design principles and includes initiatives designed to mitigate the environmental impact of the following:

- **Energy** – including reduction in energy associated to demolition, construction and operation, across the building and its associated sources (30% reduction target in Greenhouse Gas Emissions from operations);
- **Water Efficiency** – including reduced potable water demand and improved stormwater quality (45% reduction target in potable water consumption);
- **Passive Design Principles** – reducing the development's overall requirement for building services;
- **Ecology** - Maintaining ecology through landscaping where practical;
- **Materiality** – Considering the whole of life impact of materials in demolition, construction and operation stages, and considering their selection to minimise harm to the environment;
- **Waste** – implementation of best practice management techniques to reduce waste going to landfill (landfill diversion rate is targeted at 90% for construction and demolition waste, and 80% for operational waste);
- **Transport** – encouraging alternate low carbon means of transportation to and from the new Sydney Fish Market.

The above are assessed using a holistic built environment sustainability rating tool - Green Star Tool Design & As Built v1.2 - to demonstrate equivalence with industry best practice. The project is committed to achieving a formal Green Star Rated outcome (minimum 5 Star target) under **Design & As Built – v1.2**.

The following sections detail the development's specific sustainable design response in more detail.

## 2 Introduction

### 2.1 Background

Sydney Fish Market is the largest of its kind in the Southern Hemisphere and among the three largest seafood markets in terms of variety in the world. The market sources product both nationally and internationally and trades approximately 14,500 tonnes of seafood annually with up to one hundred sustainable seafood species traded every day and approximately 500 species traded annually. The site attracts over 3 million visits each year.

In November 2016 the NSW Premier announced a new Sydney Fish Market would be built at the head of Blackwattle Bay, adjacent to the existing Fish Market. In June 2017 the Premier of NSW announced the appointment of Danish architects 3XN to lead the design team that includes Sydney firms BVN and Aspect Studios. They have been working with key stakeholders, including iNSW and existing Sydney Fish Market Pty Ltd, to develop the design for the new Sydney Fish Market. As announced by the NSW Premier, works are planned to commence in 2019.

### 2.2 Site and Context

The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2km west of Sydney's CBD and is partially within the City of Sydney Local Government Area.

The land to which the development application relates comprises Lots 3 - 5 in DP 1064339 part of lot 107 in DP 1076596 and part Lot 1 in DP835794. Works to connect to the existing waterfront promenade to the west of the site are located on Lot 3 in DP1018801. The development footprint is irregular in shape and has an area of approximately 36,800m<sup>2</sup>. The site is partly on land above mean high water mark and partly on water below mean high water mark.

The site has a frontage to Bridge Road to the south and Blackwattle Bay to the north. Pyrmont Bridge Road is an arterial road that links to the Anzac Bridge to the north west of the site. Sydney Secondary College Blackwattle Bay Campus is immediately south west of the site and the existing Fish Market immediately north east. Located directly opposite the site to the south is Wentworth Park, separated by Bridge Road.

Located approximately 400m walking distance from the site are the existing Fish Market, Wentworth Park, and Glebe Light Rail stops which are serviced by the Dulwich Hill Line which is a 23 stop, 12.8-kilometre route running from Dulwich Hill to Central station via Pyrmont.

The site contains one heritage item being the heritage stormwater culvert. The site is also near a number of heritage items.

The site's current uses include a concrete batching plant at the Western end and concrete hardstand and wharf area at the Eastern end, which is currently vacant. The site includes wharves and land-based structures. Part of the site is the water of Blackwattle Bay. Works will be undertaken on Bridge Road and its intersections with Wattle Street and Wentworth Park Road.

# Introduction

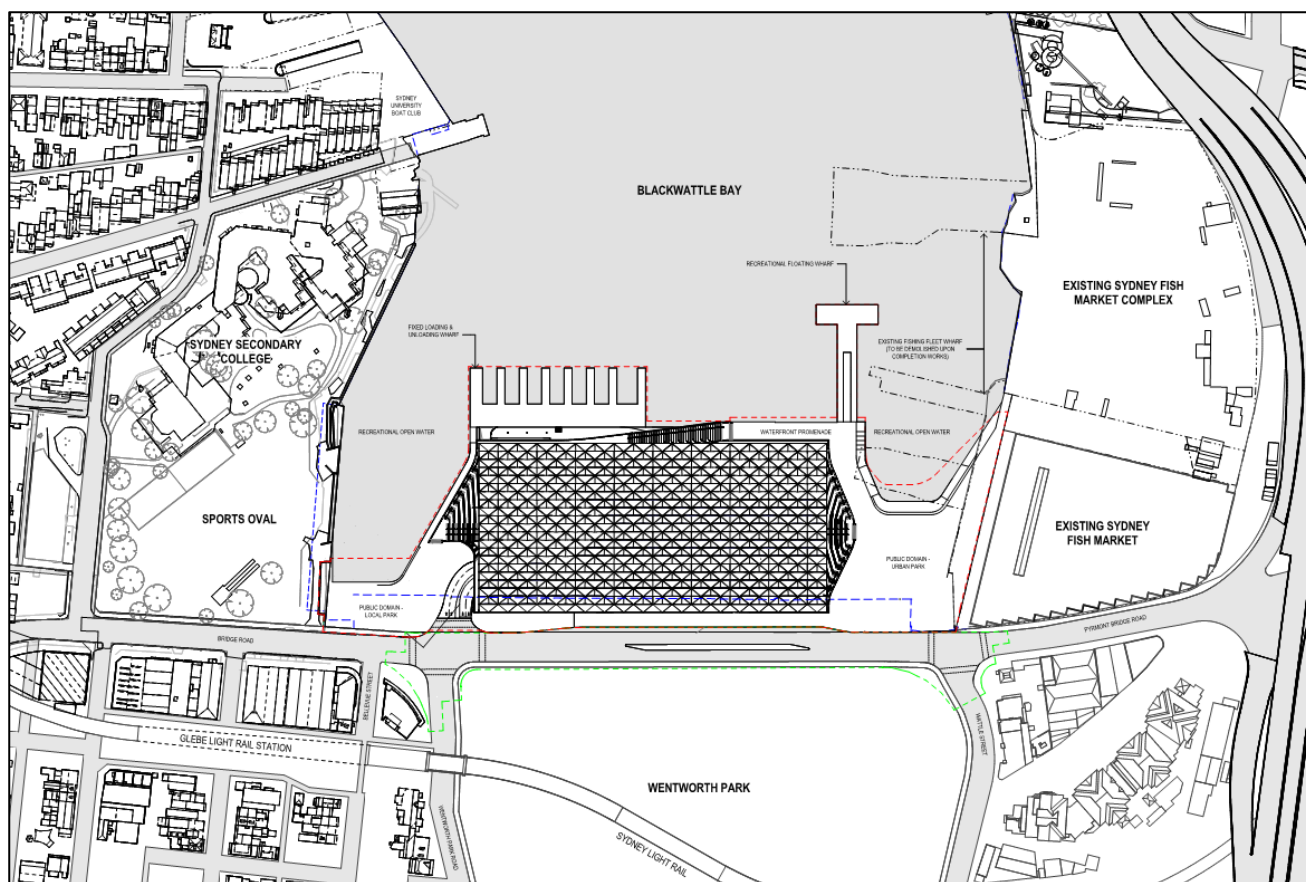


Figure 1 Overview of the site.

## 2.3 Approval Strategy

Pursuant to the provisions of the *Environmental Planning and Assessment Act 1979* and *State Environmental Planning Policy (State and Regional Development) 2011* ("SEPP SRD") the new Sydney Fish Market development is State Significant Development and the Minister for Planning is the consent authority.

To deliver the new Sydney Fish Market, the following applications will be lodged:

1. A concept development application seeking approval for concept proposals for the new Sydney Fish Market. This is to meet the requirements for a master plan contained in clause 40 of SREP26. This concept development application will also set out details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall;
2. A development application for the construction of the new Sydney Fish Market;
3. An application to amend the planning controls applying to the site to enable the proposed development to be a permissible use on all of the site. This is to be achieved by an amendment to Sydney Regional Environmental Plan No 26—City West ("SREP26").

These applications are lodged concurrently.

# Introduction

## 2.4 Summary of the development

The proposal is to build a new Sydney Fish Market with a contemporary urban design, provide unique experiences for visitors and world-class auction and wholesale facilities. The new facility will be set within an improved public domain including the creation of a waterfront promenade with improved access to Blackwattle Bay and linking to surrounding areas and to public transport.

The development will expand and improve the functions of the existing in a new setting designed to achieve design excellence, functional performance and environmental sustainability.

The new Sydney Fish Market will include retail and food and beverage premises, wholesale facilities and auction rooms, offices and commercial space, Sydney Seafood Schools, back-of-house facilities and car, truck and coach parking spaces. The new facility is to include a new foreshore promenade and wharves. The new Sydney Fish Market will be purpose built and will be supported by a state of the art back-of-house plant and recycling/waste management facilities.

### 2.4.1 Concept development application

The Concept development application seeks approval for:

1. the use of the site for the new Sydney Fish Market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
2. a gross floor area of up to 30,000m<sup>2</sup> contained within a defined building envelope;
3. waterfront structures such as wharves;
4. concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping;
5. pedestrian cycle and road access and circulation principles;
6. principles for infrastructure provision and waste management.

This concept development application will also set out details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall, and related services relocations.

### 2.4.2 Main works development application

The Main Works development application seeks approval for:

1. the construction of a new Sydney Fish Market including land and water-based structures.
2. the use of the site for the new Sydney Fish Market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
3. a gross floor area of approximately 25,830 m<sup>2</sup> as calculated according to the definition of GFA under SREP 26 (approximately 26,750 m<sup>2</sup> as calculated according to the definition of GFA under the Standard Instrument).
4. public domain works including promenades access to Blackwattle Bay and landscaping;
5. pedestrian, cycle and road access and circulation;
6. infrastructure provision and waste management;
7. associated works as required.

# Introduction

The proposed uses comprise:

## Below Ground Level

- Parking for service and delivery, and private vehicles up to approximately 417 vehicles;
- Plant and storage;
- Waste Management facilities; and
- End of trip facilities.

## Ground Level - Outside of Building Envelope

- Up to nine operational wharves for fishing fleet servicing and product unloading/loading, multi-purpose wharf space, private-operated ferry stop, recreational vehicles and the like;
- Vehicular access driveways; and
- Publicly accessible promenade.

## Ground Level - Within Building Envelope

- Wholesale services space including product storage and processing;
- Auction floor and associated refrigeration and handling space;
- Loading dock including time-limited delivery and service vehicle parking area;
- Waste management facilities;
- Exhibition space including buyers room;
- Staff amenities, plant and storage.

## Upper Ground Level (L1)

- Retail premises including fresh food retail, food and drink premises including harbour side dining;
- External/shared dining space;
- Ancillary back of house space and staff amenities; and
- Circulation areas.

## Upper Level 2 (Mezzanine)

- Catering space;
- The Sydney Seafood School;
- Tenant and subtenant office space; and
- Plant and storage space.



# Introduction

## 2.5 Purpose of this report: Addressing SEARs requirements

The purpose of this report is to address the SEARs requirements for this development as part of the Environmental Impact Statement.

This report addresses the Ecologically Sustainable Development and efficiency aspects in response to the Environmental Planning Policies for the project. It uses best practice sustainable design principles and borrows elements from external sustainability tools to develop a set of performance metrics for the site.

SEARs outlines requirements for this development that must be addressed as part of the Environmental Impact Statement. These are:

### **SSD 8924**

- Provide detail of how best practice ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the demolition, early works and ongoing operation phases of the development.

### **SSD 8925**

- Provide detail of how best practice ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design, construction and ongoing operation phases of the development.
- Outline how ESD measures employed can connect to ESD measures in the remainder of the Bays Market District.

## 3 Energy

### 3.1 General Strategy

The project is targeting a 30% reduction in Greenhouse Gas Emissions, measured in line with Green Star protocols (where emissions are compared between the proposed development and correspondent Green Star reference building), which forms part of the Green Star strategy and the Bays Precinct Transformation Plan. There is a desire for on-site renewable electricity production.

The targeted reduction represents a significant saving and is aspirational, based on leading design principles. Methods to achieve the energy outcome include:

- Improvement in lighting systems (internal and external);
- Controls of lighting systems;
- Façade performance beyond Section J requirements;
- Efficient mechanical systems, with heat recovery systems;
- Performance solutions to car park areas;
- Reduction in heating hot water load through selection of FF&E;
- Use of condensing gas boilers for centralised heating;
- Centralised mechanical systems (such as ice production);
- Natural ventilation to great portion of the retail floor area.

Based on the existing Fish Market electricity use, the consolidated total energy consumption associated to the main account, tenant building, Sydney Seafood School, toll booths and wharves, is approximately 6262 MWh per year. This will be adopted as the energy consumption baseline, apportioned on a /m2 basis by each end use.

In order to achieve these targets, a variety of energy efficiency measures will be applied to the proposed development. These energy efficiency measures may form the part of the final design and operation of the spaces. The final strategy will always be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The energy efficiency strategy follows the hierarchy pyramid below. Best practice energy conservation dictates that in the first instance demand is reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest return on investment.

# Energy

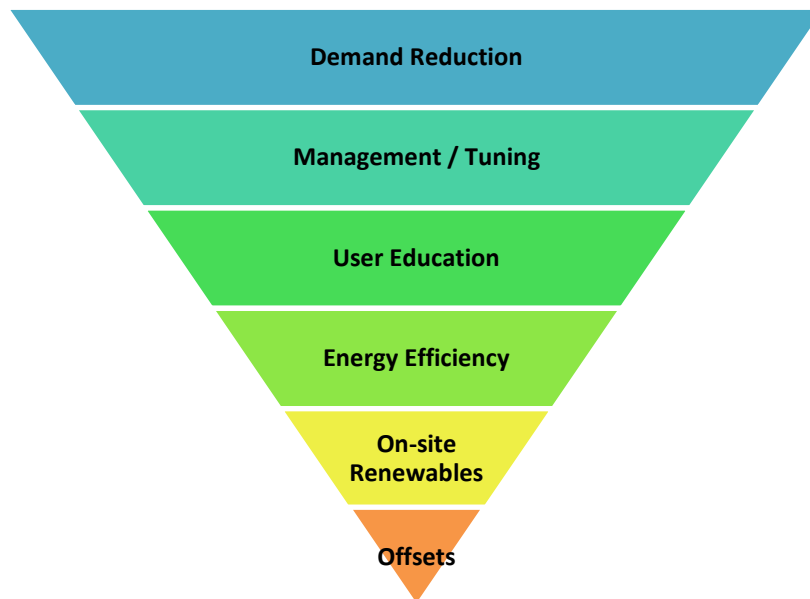


Figure 2 Energy efficiency strategy hierarchy.

## 3.2 Demolition and Construction Stages

For the Demolition and Construction stages of the project, a number of measures and targets are being implemented so that the energy consumption associated to these phases scope of works can be minimized as much as possible.

Summary of approaches:

- During design stage, dematerialization was constantly considered as an option to reduce the need for materials, what brought a positive impact to the total embodied energy from the project
- Relevant embodied energy savings associated to high recycling/reuse rates for construction and demolition material;
  - Project is targeting 90% of the construction and demolition waste to be diverted from landfill (in line with the Design & As-Built v1.2 benchmark for Credit 22. Construction and Demolition Waste).
- Use of responsible materials, which use of low embodied energy and water materials;
  - Such as wood sourced from responses with FSC or PeFC certification and steel from responsible manufacturers. Primary roof elements employ responsibly harvested and processed timbers with low or negative embodied carbon.
- Preference for sourcing materials from local or sustainable materials suppliers;
- Maximizing off-site manufacture for the reduction of operational energy, water and waste;
- Implementation of high performance – long lasting materials;
- Materials and structural components are designed and will be implemented with a great focus for flexibility, inter-changeability and reuse.

## 3.3 Demand Reduction Strategies

Demand reduction strategies are intended to provide the greatest benefit for reducing overall energy consumption of the site. This can be achieved through incorporation of passive design principles that provide the following benefits:

- Lower operational energy demand via improved thermal performance;
- Reduce the requirements for artificial lighting & power;
- Reduce the buildings' reliance on HVAC systems;
  - For example by provision of natural ventilation where adequate (such as retail floor areas).
- Potentially reduce the areas that require air conditioning; and
- Improve the project's ability to deliver a responsible development.

The passive design principles to be implemented in the design are discussed below.

### 1 Optimisation of the building fabric through the following design elements:

- Effective shading with large awnings would reduce direct solar gains without compromising the connection to the outside. Implementation of this aspect allows for larger glazed areas;



**Figure 3 - Large awnings to provide shading to windows with deep eaves on major thoroughfares.**

- Operable windows will be used with high performance glazing systems to meet or exceed the requirements of the BCA, including appropriate reduction of solar gains during summer and to reduce heat loss during winter; Installation of adequate insulative & thermo-active materials to opaque elements of the building fabric to maintain internal temperatures that are suitable for summer & winter solar exposure;
  - Use of light-coloured roofing to minimise solar absorption.
    - This is an aesthetically appropriate solution that mitigate the urban heat island effect.
- 2 To **minimise the use of artificial lighting**, natural daylight will be harnessed through the roof and reflected to achieve ambient levels. This will be supplemented with best in class LED lighting systems, strict zoning and BMCS controls to limit excess lighting.

# Energy

- 3 Use of **landscaping and adjacent water bodies** to precondition **microclimates** around entrances.
- 4 **Minimise the need for conditioned spaces** and increase the efficiency of the HVAC systems. Setting a benchmark of alfresco dining, mixed mode spaces and internal/external boundaries, the conditioning requirements will be markedly reduced.

## 3.4 Management and Tuning

The following management and tuning measures will be implemented to ensure that energy consumption is further reduced:

- Installation of all building fabric to exceed the NCC, with consideration given to thermal bridging and build quality;
- Ensure that a building tuning and commission plan is implemented prior to construction completion to ensure the building is fine-tuned and operating as designed.

## 3.5 User Education

User Education is considered to be an effective means to ensure that building users are aware of ways in which they can interact with the building to minimise or avoid energy waste. The following strategies are envisaged to be implemented to avoid energy consumption associated with usage:

- Provide tenants and the building services manager with a Building Users Guide;
- Provide tenants with a Tenant Fitout Guide to ensure that any systems they install are within the building sustainability requirements;
- Set up information kiosks for the general public that illustrates the various systems in which the building reduces energy consumption (both for passive and active systems)

## 3.6 Energy Efficient Strategies

A number of energy efficient measures can be implemented to reduce the overall energy consumption across the site. These measures are generally active design strategies that still require energy use, but with increased efficiency through optimal design of systems. Energy efficient strategies are discussed in the following sub-sections.

### 3.6.1 Lighting

High-colour, high CRI, warm LED lighting will be incorporated exclusively throughout the development. This will reduce the electrical load on the grid for the same electrical output. LED globes have a longer life, reducing replacement periods and less maintenance. Lighting controls including timing, occupancy and daylight sensors will be incorporated into the design to reduce the demand on the lighting system.

Exterior lighting will operate on timing switches with PE sensors to reduce unnecessary energy consumption. This also ensures safety and security lighting is maintained across the site.

A target lighting density will be set at 6 W/m<sup>2</sup> average across the development, in line with the targeted 30% reduction in energy against NCC limits. Lighting will be controlled by the BMCS, tracked and zoned to limit energy consumption and reduce lighting areas that do not require it.

### 3.6.2 Equipment

Only energy efficient appliances (with appropriate Energy Star Ratings, where relevant) and equipment will be used. In addition, major equipment will operate with EC Plug fans. Ceiling fans will be considered to increase ventilation and cooling in open areas as appropriate.

# Energy

## 3.6.3 HVAC Systems

Efficient and bespoke HVAC systems with high COPs will be appropriately designed and sized for the development. This will include high efficiency centralised plant, economy cycle mode, temperature band fluctuation control to increase energy efficiency in the design. Where practical, natural ventilation or mixed mode will be implemented to enable delivery of high levels of fresh air to spaces and reduce the energy consumption associated with HVAC systems.

Highly articulated conditioning zones will be incorporated. For example, conditioning for zones specifically where products are sold, independently from zones occupied by the general public.

Low-pressure cool air supply at low level will be investigated in the auction hall where products are stored near ground. This allows cooling of the products only, not the entirety of the volume of air in the hall leading to energy savings.

Radiant heat and or cooling with appropriate materials will be implemented to condition high-volume or open spaces.

Diagram explaining order of choices in energy system design

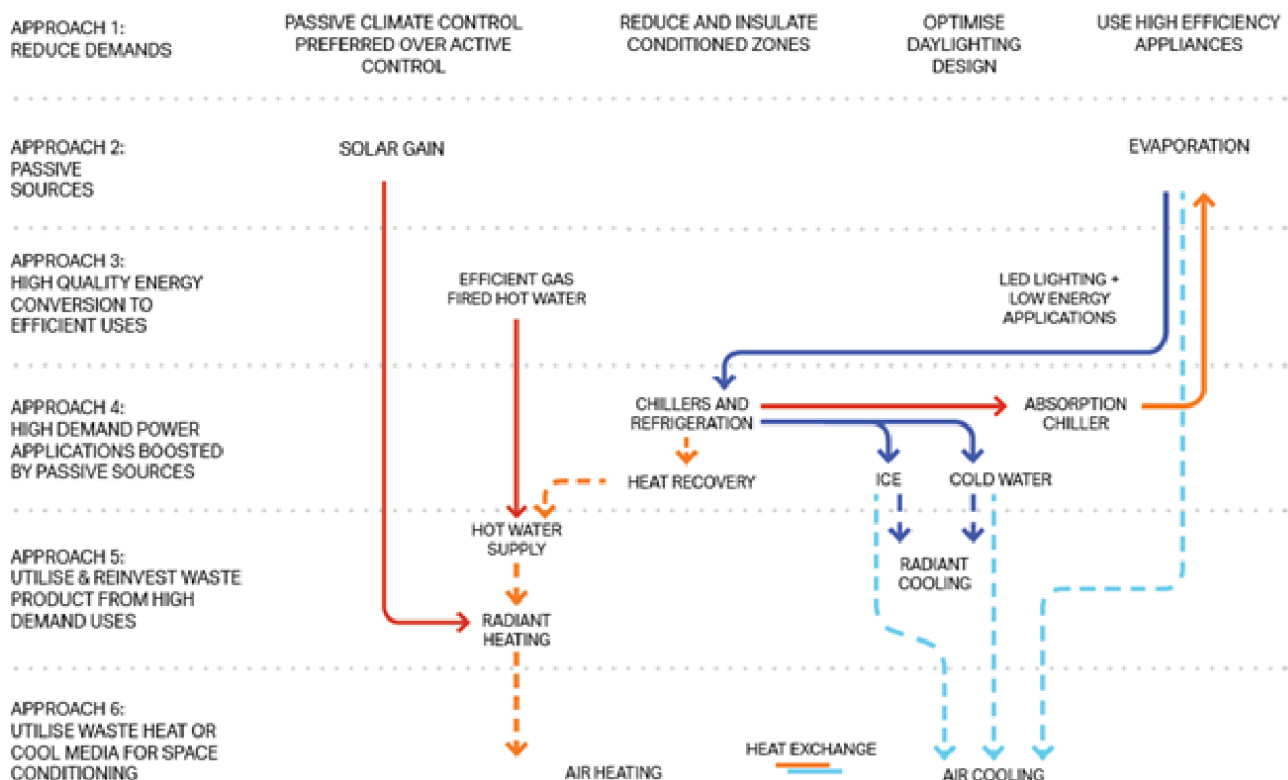


Figure 4 - Refrigeration, Mechanical Systems and Sustainability Concepts Diagram



## 3.7 Renewable Energy Production

The following initiatives for Renewable Energy Production will be considered in the final design to minimise utilisation of energy from the grid system:

- Installation of a rooftop solar system that incorporates PV cassettes designed to provide approximately 5% of the total building electricity load that are interchangeable with standard roof cassettes. The system can be designed so that renewable energy is prioritised for use. Consideration can also be given to selling excess energy back into the grid or storage on site for peak reduction.

It is noted the total considered electricity consumption is estimated and its actual demand will depend on the final arrangement as dictated by the new Sydney Fish Market and the building services design.

3XN, GXN and WGE support the integration of Photovoltaic systems in the project. Considering the favourable financial leverage available for such projects, and the potential rises in energy costs, incorporation of PV technology is considered reasonable on the balance of considerations.

Three different PV types / solutions are currently being considered, further analysis during design progress will determine the most appropriate system to be applied.

**Option A:** Semi-flexible polycrystalline to tip of flat cassettes;

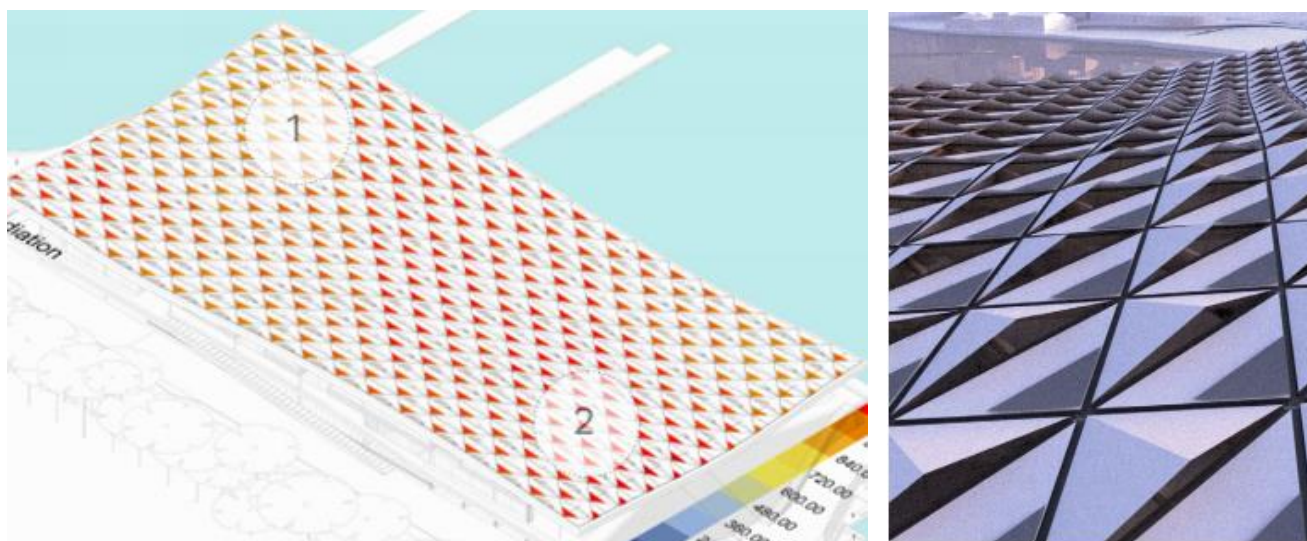
**Option B:** Hard polycrystalline units mounted as separate units onto roof perimeter flat cantilever area;

**Option C:** Hard polycrystalline cells integrated into angled surface of the roof cassettes.

The three options have the potential to achieve solar energy production that meet the targeted 5% production of the total building electricity load, and are also considered aesthetically appropriate solutions. The final design solution is subject to detailed feasibility of the three options.

### Option A: Semi-flexible polycrystalline to tip of flat cassettes

Lamination of flexible PVs onto roof modules during off-site production represents the simplest method of installation as PV cells are adhered onto the waterproof membrane and do not cause penetration. Flat conductors instead of wiring may be integrated in module pre-production without causing dimensional issues. Custom shaped laminated arrays are relatively easy to achieve in large quantities such as those represented by this project.



**Figure 5 – Option A: Illustration of the PV System configuration.**  
(Further analysis during design progress will determine the final PV cassettes layout).

## Energy

### Option B: Hard polycrystalline units mounted as separate units onto roof perimeter flat cantilever area

While cost and efficiency benefits exist with standard hard-cell modules mounted on-top of the roof module, mechanical penetrations cause significant complications in the construction of a waterproof system, affecting the warranty and maintenance of the waterproof membrane. Maintenance such as cleaning beneath the cells may prove difficult and costly.

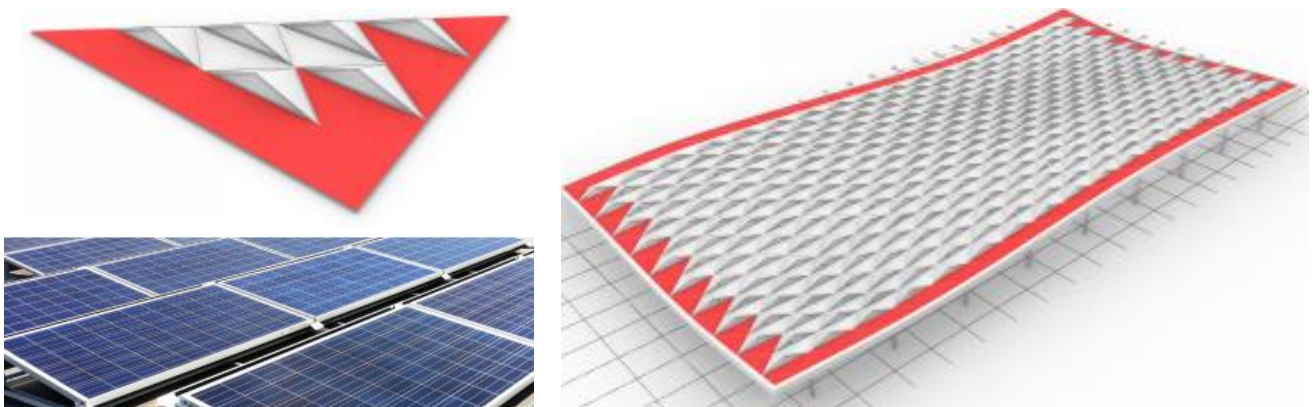


Figure 6 - Option B: Illustration of the PV System configuration.  
(Further analysis during design progress will determine the final PV cassettes layout).

### Option C: Hard polycrystalline coloured cells integrated into angled surface of the roof cassettes.

Option C consists of coloured PV cells integrated into both west and east angled surfaces of the roof cassette – to approximately 35% of the roof area. This provides a number of benefits:

- Maximum surface area provided;
- Uses the more efficient hard polycrystalline PV than Option A;
- Does not penetrate the membrane;
- Does not impact structure significantly, as majority of weight is not on the cantilever (as per Option B).

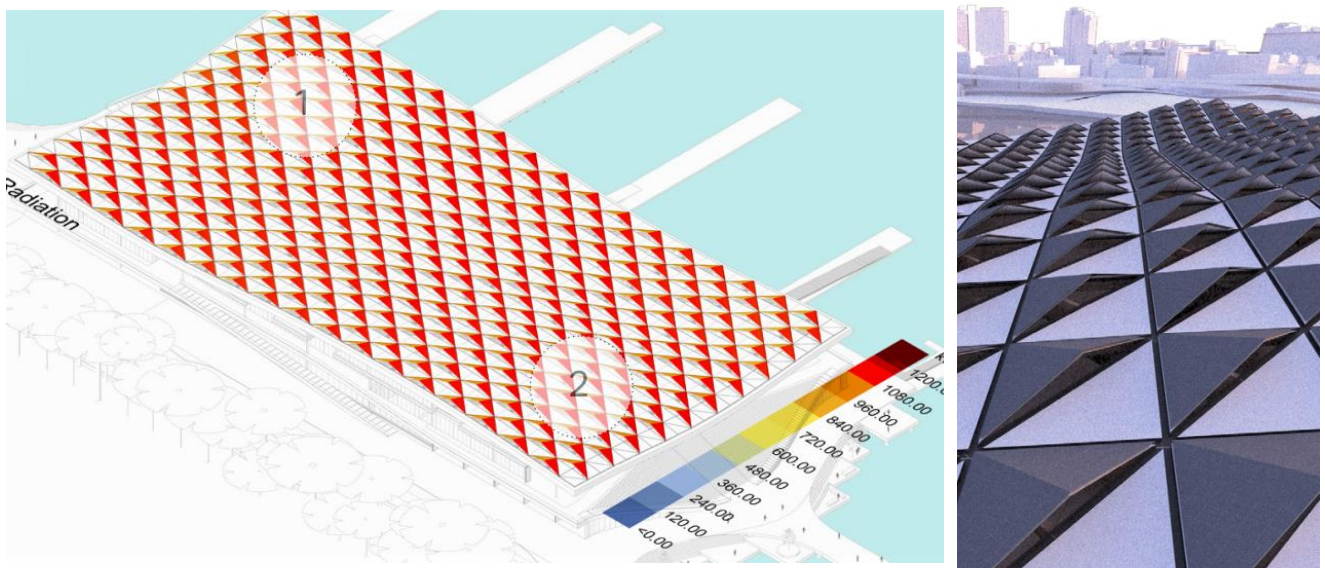


Figure 7 - Option C: Illustration of the PV System configuration.  
(Further analysis during design progress will determine the final PV cassettes layout).



## 3.8 Greenhouse Gas Emissions Offsets

There will be a target to lower on site GHG emissions associated to operations by approximately 30% with an offset of 5% through desirable renewable energy on-site production initiatives described in the preceding sub-section.

An integrated and tailored system for the recovery and reuse of heating and cool sources will ensure a minimised capital energy expenditure, in order to achieve emissions targets and cost savings in construction and operation.

### 3.8.1 NSW Government Commitments

NSW Government has committed to an aspirational objective of carbon net neutrality by 2050 in accordance with ratifying the Paris Agreement. Net zero is defined as NSW's emissions equalling the sequestration of carbon.

The four pillars of Carbon Neutrality are:

- Using Energy More Efficiently;
- Producing Low Carbon Electricity;
- Electrification and cleaner fuels;
- Non-energy emissions and offsetting.

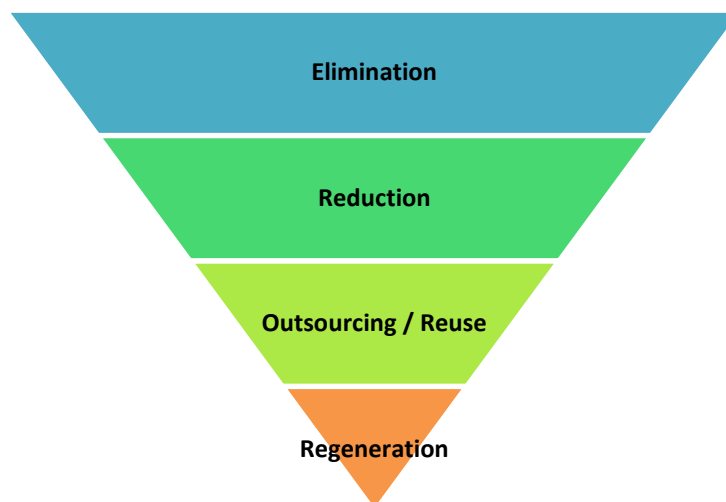
The third pillar of this movement relies on decarbonising the electricity grid. For this to be successful, it will require the grid's Carbon intensity to reduce by 80% before any benefit is achieved over current sources of natural gas.

## 4 Water Use

### 4.1 General Strategy

As part of the Green Star rating strategy, the site is targeting a 45% net reduction of potable water against current industry norms, as defined in the project brief. This will be benchmarked and demonstrated by achieving 45% reduction under Green Star protocols for potable water. The development aims to in the first instance reduce the need for potable water consumption, capture non-potable water and reuse water where possible. The existing Fish Market requires around 125,000 kL of water per annum including tenancies. Tenancy water use will be set against equivalent food service & HoReCa baselines.

To achieve the site-wide target being pursued by the development, the water management hierarchy below has been adopted for minimising potable water use. Elimination would be the provide the greatest benefit with site regeneration being the least preferred option.



**Figure 8 - Water Management Hierarchy**

The principal uses on the site can be broadly categorised into the following and will be addressed in the following sub-sections:

1. Potable + food production and sanitation
2. Treated rain/greywater for cleaning, flushing and heat rejection
3. Landscape use & filtration

A variety of water efficiency measures are applicable to the proposed Development, which are intended to influence the final design and operation of the spaces. This includes incorporation of water recycling systems, rainwater reuse. In general, the proposed water cycle would incorporate water collection from the roof, filtration, storage, water use or refrigeration, irrigation and recycling.

### 4.2 Demolition and Construction Stages

For the Demolition and Construction stages of the project, the below approaches will be implemented so that the impact to the water consumption associated to these phases scope of works can be minimized as much as possible:

- Preference for responsible materials and suppliers, which use of low embodied water materials;
  - Such as concrete production, that uses captured or reclaimed water.
- Maximizing of-site manufacture for the reduction of operational energy, water and waste.

# Water Use

## 4.3 Elimination

Where possible, potable water use can be eliminated through adopting systems that use alternative media in place of water. Some considerations include:

- Use of native plants – Plants designed to thrive in the Australian environment and low water consumption plants will eliminate a component of the needs for potable water irrigation.
- Water education plan to provide information to users regarding their water consumption and ways they can eliminate or avoid water use where possible.

Where the above strategies cannot be adopted for any reason, the water reduction strategies described in the following sub-section should be implemented.

## 4.4 Water Reduction

Where elimination of water use cannot be avoided, there are a multiple water reduction measures that will be implemented. These are discussed in further detail below.

### 4.4.1 Water Efficient Fixtures and Fittings

By installing high performance fittings and fixtures, the water consumption associated with amenities and shops can be reduced. The following minimum WELs rated will be adopted:

- 4 Star Toilets with half flush capability
- Waterless Urinals
- 5 Star tapware
- 3 Star showers (6.5L/min) in End of Trip facilities

### 4.4.2 Water Efficient Irrigation

Methods to reduce water consumption in landscaped areas include drip-system irrigation for trees and larger plants. Consideration should be given for the use of moisture sensors and the use of native plants in the landscaping plan.

Natives are designed to thrive in the Australian environment and are typically more resilient than their exotic counterparts. Where possible, these should be planted along with other low-water use species.

### 4.4.3 Water Monitoring Systems

Water monitoring systems, through a BMCS system, will be used to identify leaks and implement measures to minimise water losses. The system could also be used to establish water consumption and develop further strategies to minimise potable water use from the water mains.

### 4.4.4 Integrated Water Features

The potential for using ponds, waterfalls, evaporation cooling elements and water playgrounds can be explored, which would provide additional passive cooling effects to the site through the Aeolian transportation process.

### 4.4.5 Mechanical Heat Rejection

The use of high efficiency, correctly sized cooling towers will assist greatly in the water consumption. High Cycles of Concentration of 10-12 will be employed, along with drift blockers. This will ensure the majority of water will be used for rejection.

# Water Use

## 4.5 Water Reuse / Outsourcing

### 4.5.1 Water Sensitive Urban Design (WSUD)

The WSUD principles will be implemented by the project and specifically for water reuse. These include:

- **Utility meters** designed to meet metering guidelines under the weights and measurement legislation, as outlined under the current National Measurement Regulations.
- An automatic **monitoring system** which records both consumption and demand will be considered, capable of producing quarter hour, hourly, daily, monthly and annual use for all meters.
- **Rainwater Reuse** – A rainwater tank will be implemented as appropriate. Further feasibility is to be completed regarding the ideal end-use for any non-potable water uses on site. Rainwater on this site is particularly advantageous given the significant collection area across the building roofs. There are also ample reuse opportunities including HVAC heat rejection, cleaning, toilets and landscaping.
- **Landscape Irrigation** – Landscape irrigation supply may be sourced from on-site runoff water resulting in a net lower potable water demand. In the event additional potable supply is to be connected, a drip irrigation system with moisture sensor override is to be installed.
- **Stormwater detention systems** designed to retain a significant volume of stormwater on-site.
- **Stormwater treatments** – Treatments such as gross pollutant trap and filtration system to improve the water quality of stormwater.
- **Vegetated stormwater treatment** – Measures such as natural bio-retention systems to improve the quality of stormwater.
- **Greywater recycling** – Greywater subjected to post treatment process. This initiative still to be confirmed pending feasibility.

### 4.5.2 Rainwater Reuse

Rainwater reuse through collection from the roof to reduce water consumption will be adopted. Water collection from the roofs would be effectively and efficiently collected through the bespoke roof cassette design. Modelling has demonstrated the potential to reuse 11 ML of rainwater collected from the roof in cooling towers or other uses, such as landscaping irrigation, supply to amenities such as toilets and taps, wash downs for the crate washing areas, auction hall, storage and refrigerated areas.

## 4.6 Water Regeneration

### 4.6.1 Bio-filtration

Bio-filtration is a critical treatment process in the treatment of stormwater for reuse. Bio-filtration utilises aqueous and non-aqueous vegetation to primarily treat nutrients in the stormwater discharge from urbanisation. Nutrients consists of nitrogen and phosphorus compounds found in the water from biodegradation of organic matter, precipitation, animal waste and farming activities. Nutrient loading in the stormwater promotes eutrophication, inducing excessive plant growth and algal blooms. This can be harmful to aquatic species as eutrophication may cause depletion of oxygen in the water.

Bio-filtration treatment of stormwater is beneficial to the community as it reduces the impact of urbanisation on the receiving water bodies. Bio-filtration is typically in the form of constructed wetlands, vegetated swales and basins, and media filtration. Due to their vegetated design they can get integrated into landscaped areas and can visually enhance the open spaces.

# Material Resource Efficiency

## 5 Material Resource Efficiency

### 5.1 General

The material impact of a building consumes precious and often limited resources. These include the building materials in demolition, excavation and construction of the initial build, the goods bought and sold through the stores, maintenance, retail fitouts and the food eaten by the building occupants.

As part of sustainability commitments, the new Sydney Fish Market aims to increase upcycled/recycled material use, material knowledge and use of healthy materials with the aim of achieving a 25% reduction in Global Warming Potential relative to an equivalent design. This will be achieved through implementation of a comprehensive Life Cycle Analysis (LCA) that includes material use during demolition, construction, site delivery, operations, waste and end of life disposal. The development will be analysed in accordance with ISO 14044, and EN 15978. The LCA will be used as a design tool to advise the project team on methods, materials and measures that will reduce the environmental impacts of the development.

### 5.2 Demolition Materials

The project is targeting 90% of the construction and demolition waste to be diverted from landfill, by reusing or recycling building materials (in line with the Design & As-Built v1.2 benchmark for Credit 22. Construction and Demolition Waste).

### 5.3 Responsible Materials Construction

Construction materials are a highly carbon intensive component of any development. They often involve energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development. However, there are a number of environmentally friendly practices starting to become accepted by the construction industry. Depending on the materials selected for the constructions, and the options available in the area, the following will be adopted for material selections during the pre-construction process:

- Design for future flexibility with preference for separate construction methods that allow raw materials to be recycled;
- Use of low embodied energy and water materials with preference for sourcing from local or sustainable materials suppliers;
- Responsible use of materials such as wood sourced from responses with FSC or PeFC accreditation, and an intact chain of custody certificate.;
- Use of Low VOC and low formaldehyde products; and
- Use of high recycled content in concrete and reduction in Portland cement

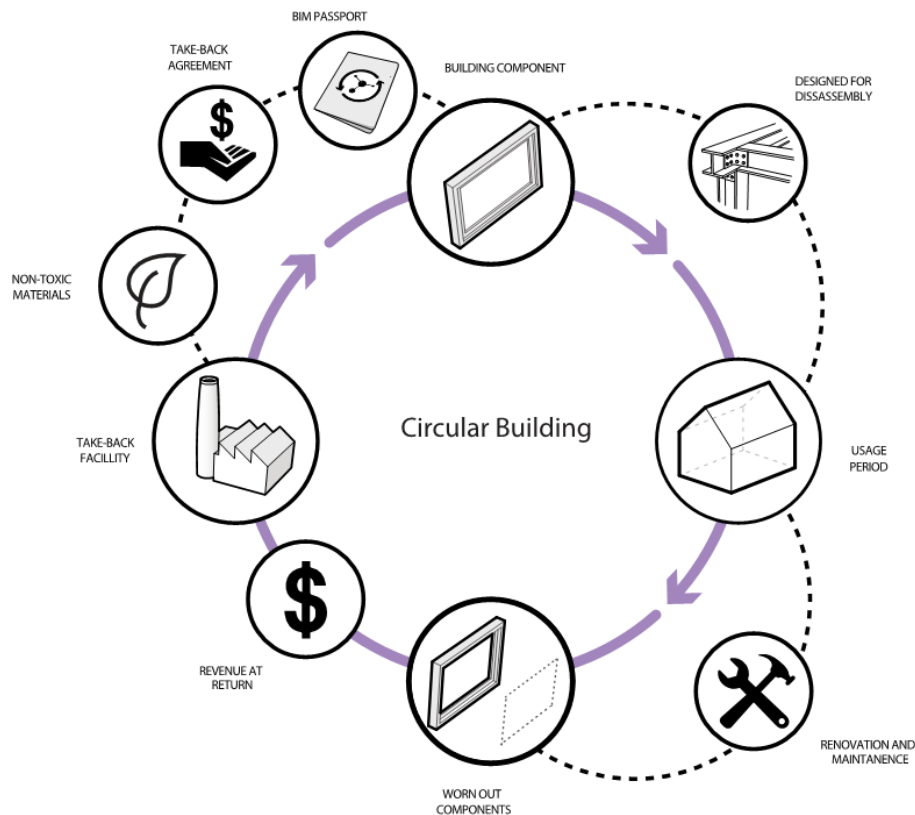
### 5.4 Material Performance

In addition to the selection of sustainable materials, the following considerations will be given to material performance to ensure that they do not require replacement in future due to poor or ineffective performance:

- Materials and structural components are designed for flexibility, interchangeability and reuse;
- Selection of hygienic surfaces - such as stainless steel to minimise bacterial growth in porous surfaces;
- Appropriate materials that are specific for intended use of the space - such as non-slip and antibacterial properties for wet areas or where product is being stored;
- Appropriate use of material for the building fabric for maintaining optimal IEQ conditions – this includes use of material with high thermal mass, insulation between conditioned/unconditioned zones, highly reflective glazing to minimise solar gains during hot weather;

# Material Resource Efficiency

- Preference for external highly reflective surfaces, which assists preventing a heat island effect.



**Figure 9 - Materials Life Cycle**

## 5.5 Future Flexibility Design

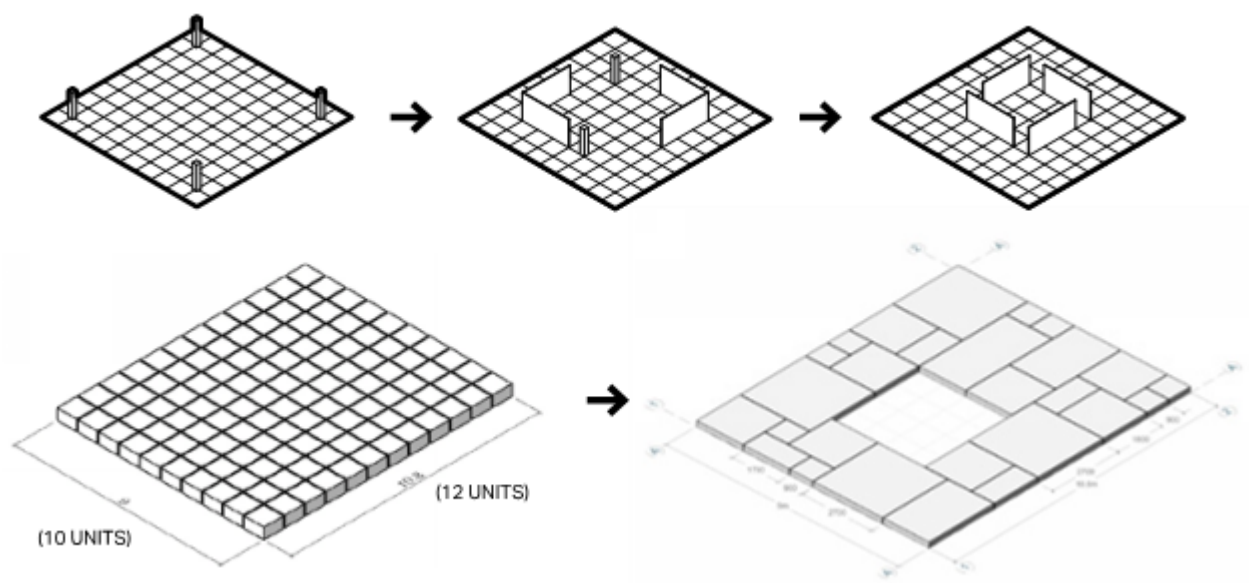
A core aspect of the new Sydney Fish Market design is to handle growth and change without the necessity to increase the building footprint or roof form. Modularity based on the structural grid is inherent in the architectural intent of the project.

Mechanical and hydraulic services have been located in such a way as to allow implementation, removal or exchange after construction without disrupting the core building structure.

Car parking and auction hall are foreseen to be double programmed or modified in line with future technological and transport developments.

Inherent modularity of a divisible structural grid such as the grid of 9 x 10.8M offers 2 subdivision sizes (0.9m and 1.8m) where the length is the same in both directions. Modules and structures may be used that operate equally in both directions. A kit of modular parts based on these sizes works equally in both grid directions.

## Material Resource Efficiency



**Figure 10 - Flexible Modular Configurations**

The key features of the modular structural grid are:

- Structural components including floors and non-essential columns based on interchangeable modules. This allows elements to exchange, and move without being discarded as waste;
- Major components of the retail fit-out including facades, security systems, signage and ceiling systems are designed to be interchangeable to ensure the building can adapt to changes in future use;
- Functional roof modules are interchangeable based on mechanical requirements;
- Interchangeable components can be pre-produced offsite. Efficiencies in pre-production reduce capex;
- Hydraulic and HVAC services are reconfigurable without changes in structural slabs allowing tenancy variations to occur without major building works

### 5.6 Construction and Operational Management

Quantification of materials will be conducted in the planning stages to reduce the risk of over ordering materials.

All materials used for construction will be documented for future re-use and recycling including information regarding maintenance.

A Building User's Guide and Tenant Fitout Guide that addresses responsible commissioning of sustainable material sources will be implemented to ensure that non-recyclable materials are prohibited.

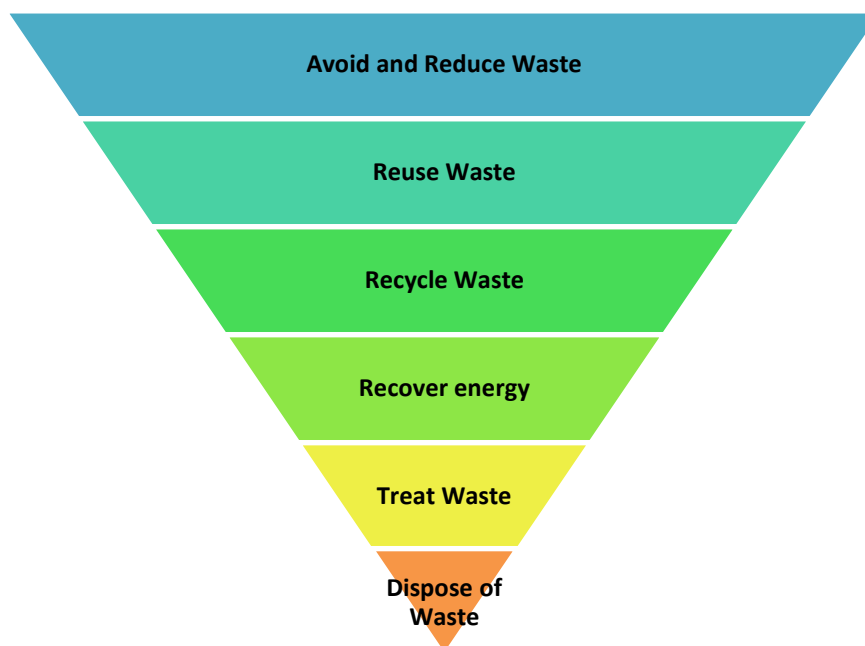
## 6 Waste

### 6.1 Overview

As part of the City of Sydney's Waste Management Policy, waste minimisation and resource recovery, easy access to waste systems, pollution prevention associated with waste management practices will be taken into consideration as part of waste management strategy.

It has been identified that fish offal comprises the largest contribution of waste generation by building operations, followed by general waste. Current waste practices involve separation into 3 waste streams (recyclables, general waste, organic waste), collection and disposal. This current practice results in some organic waste being mixed with general waste, which is ultimately disposed of to landfill.

The new Sydney Fish Market is committed to increase on-site recycling and resource optimisation through adoption of the Waste Management Hierarchy with the ultimate goal of reducing waste going to landfill, which is in line with the *The Waste Avoidance and Resource Recovery Act, 2001* and the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*. The waste reduction strategy follows the hierarchy pyramid below.



**Figure 11 –The waste hierarchy**

The initiatives contained and listed in the following sections are extracted from the Waste Management Plan developed by AECOM, which addresses Demolition, Early Works, Construction and Operation Waste Management Strategies.



## 6.2 Demolition, Early Works and Construction

The project is targeting 90% (by weight) of the demolition and construction waste to be diverted from landfill, by reusing or recycling building materials (in line with the Design & As-Built v1.2 benchmark for Credit 22. Construction and Demolition Waste).

This will be a met through contractual requirement with the Head Contractor, where a Green Star Specification will be prepared by the project team to ensure activities and initiatives will be undertaken.

Potential solutions for management of each type of waste were identified and analysed against site constraints. The focus of the options analysis was the operation phase; however potential measures for maximising resource recovery and management of residual waste during the demolition & early works and construction phases were identified to meet the respective SEARs requirements.

Recommendations for waste management strategies were based on implementation of the waste hierarchy, encompassing the whole waste lifecycle from generation and collection through to transport, processing and disposal. The proposed waste management strategies for each of the project phases are summarised below.

The key objectives for the management of waste generated by the demolition, early works and construction are to:

- Minimise waste generation on site and recycling generated;
- Segregate waste on site to maximise recycling;
- Segregate hazardous waste for appropriate treatment and disposal, where applicable;
- Divert 80% of waste from demolition activities away from landfill;
- Divert 95% of waste from construction activities from landfill.

These objectives are in line with the WARR (*The Waste Avoidance and Resource Recovery Act, 2001*), the *City of Sydney waste strategy and action plan 2017-2030*, and *The Bays Precinct Transformation Plan 2015*.

### 6.2.1 Waste Avoidance

#### Demolition and Early Works

The demolition contractor shall:

- Take advantage of opportunities for beneficial reuse for ENM and/or VENM generated from excavation works if possible;
- Sort and segregate site preparation and demolition wastes to ensure efficient recycling of wastes;
- Store wastes on site appropriately to prevent cross-contamination and/or mixing of different waste;
- Ensure subcontractors are informed of and implement site waste management procedures.

#### Construction

The following will be undertaken to avoid waste generation:

- Apply practical building designs and construction techniques;
- Sort and segregate construction wastes to ensure efficient recycling of wastes;
- Store wastes on site appropriately to prevent cross-contamination and/or mixing of different waste;
- Exercise a preference for long lifespan and/or high potential for re-use in selecting construction materials;
- Re-use formwork where appropriate;
- Reduce packaging waste;
- Ensure subcontractors are informed of and implement site waste management procedures.

# Waste

## 6.2.2 Reuse, Recycle and Disposal

The demolition, early works and construction contractor shall implement the following with respect to re-use, recycling and disposal of site preparation and demolition waste:

- Provide separate waste bins for recyclable and non-recyclable general wastes;
- Assess excavation spoil for contamination status and beneficial re-use;
- Waste oil to be recycled or disposed of in an appropriate manner;
- Retain used crates for storage purposes unless damaged;
- Recycle cardboard, glass and metal wastes;
- Returning packaging to suppliers where possible and practicable;
- Recycle or dispose of solid waste timber, brick, concrete, tiles, asphalt, and rock (where such waste cannot be re-used on site) to an appropriately licensed construction and demolition (C&D) waste recycling facility or an appropriately licensed landfill;
- Dispose of all asbestos, hazardous and/or intractable wastes in accordance with SafeWork NSW and NSW EPA requirements; and
- Batteries to be delivered to off-site recycling facilities/centres.

## 6.2.3 Waste Segregation, Storage and Servicing

Waste materials produced from site preparation, demolition and construction activities are to be segregated and stored separately on site. It is anticipated that the site will provide allowances for separate storage (e.g. separate skip bins and/or appropriately managed stockpiles) of all relevant waste types, such as bricks and concrete, metal and sheet, timber, glass, paper and cardboard, hazardous waste, non-recyclable general waste, etc.

## 6.2.4 Monitoring and Reporting

Records of volumes or tonnages of waste re-used, recycled, or disposed to landfill shall be maintained by the building contractor. Additionally, dockets/receipts verifying recycling and/or disposal in accordance with the WMP are to be retained.

Site personnel will undertake daily visual inspections of waste storage areas to identify and rectify any issues concerning waste management at the site, as well as identifying opportunities to improve waste management at the site. A written record of these inspections, which will include observations made and the results of any remedial actions taken, is to be undertaken and retained by the building contractor as part of the construction environmental management documentation.

## 6.3 Operational Waste

The objectives for the management of waste generated by the operations are to:

- Minimise waste generation on site and recycling generated;
- Segregate waste on site to maximise recycling;
- Identify solutions to manage specific waste streams in a manner that maximises diversion from
- Landfill (e.g. Expanded polystyrene); and
- Divert at least 80% of waste from operations from landfill.

These objectives are in line with the Bays Precinct Transformation Plan 2015 and exceed the requirements of the WARR Strategy and the City of Sydney waste strategy and action plan 2017-2030.

A detailed Waste Management Plan developed by AECOM will be implemented for the following five principal areas that generate waste:

- Retailer Space, Cooking School and Restaurants;
- Public Areas;
- Wholesale Areas;
- Auction Hall and Loading Dock;
- Wharfs.

The waste streams generated from each principal area can be identified to establish appropriate and targeted waste strategies suitable for that area. For example, Public Areas would generate a lot of recyclables, whereas the Wholesale Area would generate more organic waste.

The strategy outlined in the WMP has been developed by adopting the waste hierarchy as a framework for waste management practices to achieve the best environmental outcomes.

Waste minimisation measures have been considered and would continue to be developed and implemented during the operations. Waste prevention and minimisation would be addressed, where feasible, through the use of efficient operation techniques to minimise generation of residual waste not suitable for re-use or recycling.

Best practice waste management strategy dictates that the avoidance, reuse and recycle of waste are the preferred and more efficient ways of achieving efficient resource use. In line with this, the project waste reduction strategies will include the following initiatives:

- Source separation of waste streams at the proposed new Sydney Fish Market shall be implemented to aid material reuse and improve recycling; in particular, source separation of organic and recyclable waste will be introduced.
- Transport of fish offal for off-site for processing into animal feed.
- Transport of dry recyclables to off-site material recovery facility.
- Implementation of continuous improvement strategies (for example Total Quality Management and Lean Principles) in operational and maintenance practices, to optimise the use of resources and minimise the amount of waste generated.
- Application of most efficient processes and/or “green technology” to ensure sustainable uses of energy, water and natural resources.
- Adopting a cradle-to-cradle (regenerative) approach in design and planning of operational works.
- Promotion of safe handling procedures of products in line with regulations and industry best practices
- Implementation of sustainable procurement practices for example the use of biodegradable tableware instead of plastic-based products (especially in public dining areas). This may be achieved through the use of ‘green contracts’ with retailers which identify requirements for use of reusable and/or recyclable consumer products.

# Sustainable Transport

## 7 Sustainable Transport

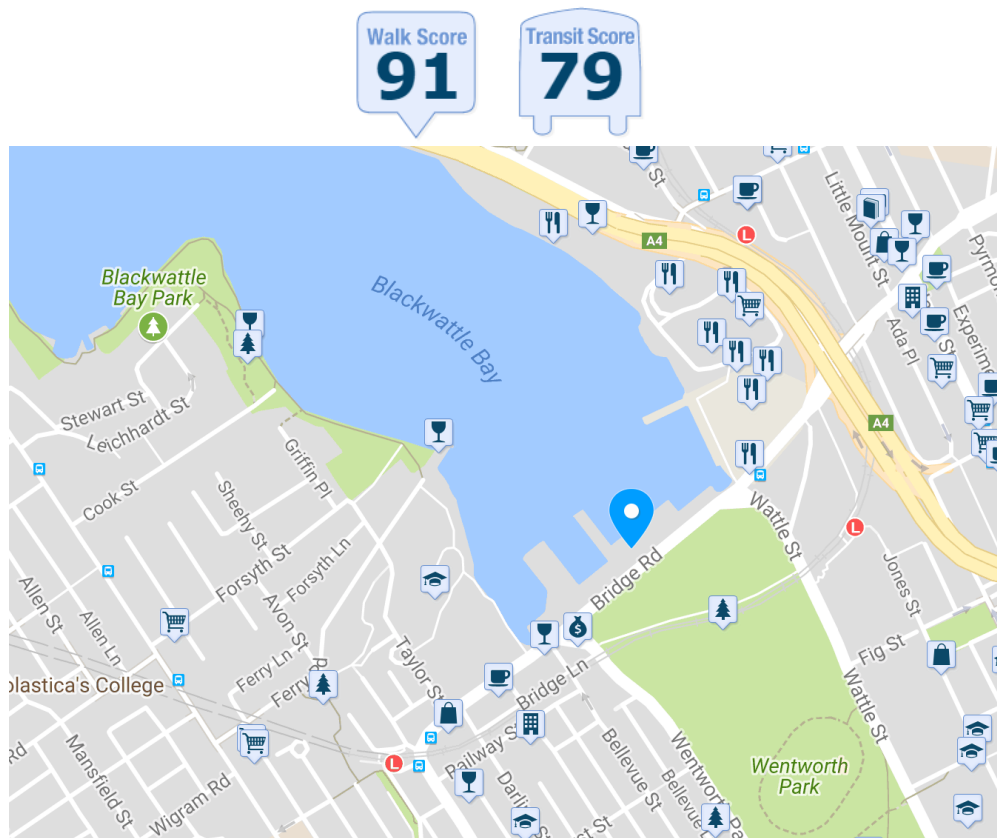
### 7.1 General

The new market is to be located on the water and a park, and across the promenade. Rather than allowing the new building to become disruptive of the connection between the existing qualities, the design treats the new Sydney Fish Market as a critical component of the community: a catalyst for a strengthened relationship, both physically and through the identity, it offers to locals and visitors alike.

Refer to the Transport Impact Assessment developed by Arup for full details

### 7.2 Location

The site is located in what is described as a “walker’s paradise”, rated 91 by WalkScore. The surrounding amenity drives this high rating, described as easily accessible to most items in the vicinity. A transit score of 79 describes the most trips will be convenient.



**Figure 12 Amenities options close to the new Sydney Fish Market.**

Source: Walkscore, [www.walkscore.com](http://www.walkscore.com).

# Sustainable Transport

## 7.3 Public Transport

The current transport plan allows for many differing modes of transport, encouraging users to take alternate means. The development encourages additional foot traffic through the future completion of the pedestrian promenade.

Existing bus routes connect the city and the inner west to the site. The site is located 25minutes walk from Wynyard and Town Hall stations. Pyrmont Bay ferry is a 15 minute walk away, connecting patrons to North Sydney and Circular Quay.

A future light rail stop will drop visitors on the doorstep of Wentworth Park.

## 7.4 Alternate Transport Options

### **Bicycle:**

Bicycle parking is considered in line with Green Star requirements. Based on existing utilisation, a future provision of minimum 76 bicycle parking spaces are proposed by the traffic consultant. It is noted the City of Sydney DCP does not directly apply, as this is a State Significant Development.

### **Foot:**

The bays district is slated to add a significant water promenade, linking the entire southern harbour edge for an uninterrupted distance of 14km. The new Sydney Fish Market links harmoniously to this system. The Bays Promenade is being fast tracked as an item of key importance, linking Pyrmont to Blackwattle Bay.

## 7.5 Bays Promenade

“The Bays Waterfront Promenade will provide the opportunity to safely walk or cycle along the Sydney Harbour waterfront, all the way from Balmain through to the Sydney CBD and Woolloomooloo – a trip that follows the beautiful Sydney Harbour, with opportunities to sit by the foreshore with a coffee, enjoy a long lunch at a waterside café, access the Harbour for water-based activities, admire locally-produced sculptures or art, gaze at amazing views and even pop in to see the busy activity of a local community garden.

### **Features**

- Providing a 5.5 kilometre continuous public foreshore access
- Staging public access to previously excluded areas
- Starting with Stage 1 linking Blackwattle Bay to Pyrmont
- Providing benefits for existing and future businesses exposed to new pedestrian trade
- Reconnecting Balmain to Pyrmont by working towards the adaptive re-use of Glebe Island Bridge
- Increasing visual and physical links to Sydney Harbour and The Bays Precinct
- Providing a mix of green shorelines and living sea walls”

Source: The Bays Precinct Transformation Plan (Oct, 2015)

## 8 Environmental & Building Management

Via the implementation of industry recognised best practice frameworks, the project design and built form will seek to respond to the ongoing environmental challenges of urban development and ensure the project implements a range of ESD initiatives aimed at improving ongoing building management.

Through specific contractual commitments and documented design intent the project will seek to address environmental management & building operational performance through the following initiatives.

- **Building Commissioning & Tuning Procedures** – (prior to practical completion / 12 months post practical completion). By implementing this via project contract documents the project ensures operational efficiency & building operation is optimised in accordance with the intended building design.
- **Energy Metering** – sub-metering will provide real-time data for the use & management of building staff. Ensures operational efficiency is maintained.
- **Waste provisions** – appropriate waste provisions are to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.

## 9 Indoor and Outdoor Environmental Quality

### 9.1 Micro-Climatic Zoning

Improved indoor environment quality is a significant by-product of sustainable building design. The architectural design by 3XN/GXN Architects have given significant consideration to the incorporation elements within the project intent to improve indoor environment quality, including outdoor spaces that are an extension of the building footprint. The figure below indicates that there are 7 different types of micro-climatic zones that require specific conditioning. In this case, Zones 3 to 6 are considered mediated spaces that are intended to provide appropriate levels of comfort based on space use.

#### Zonal design of environmental conditions

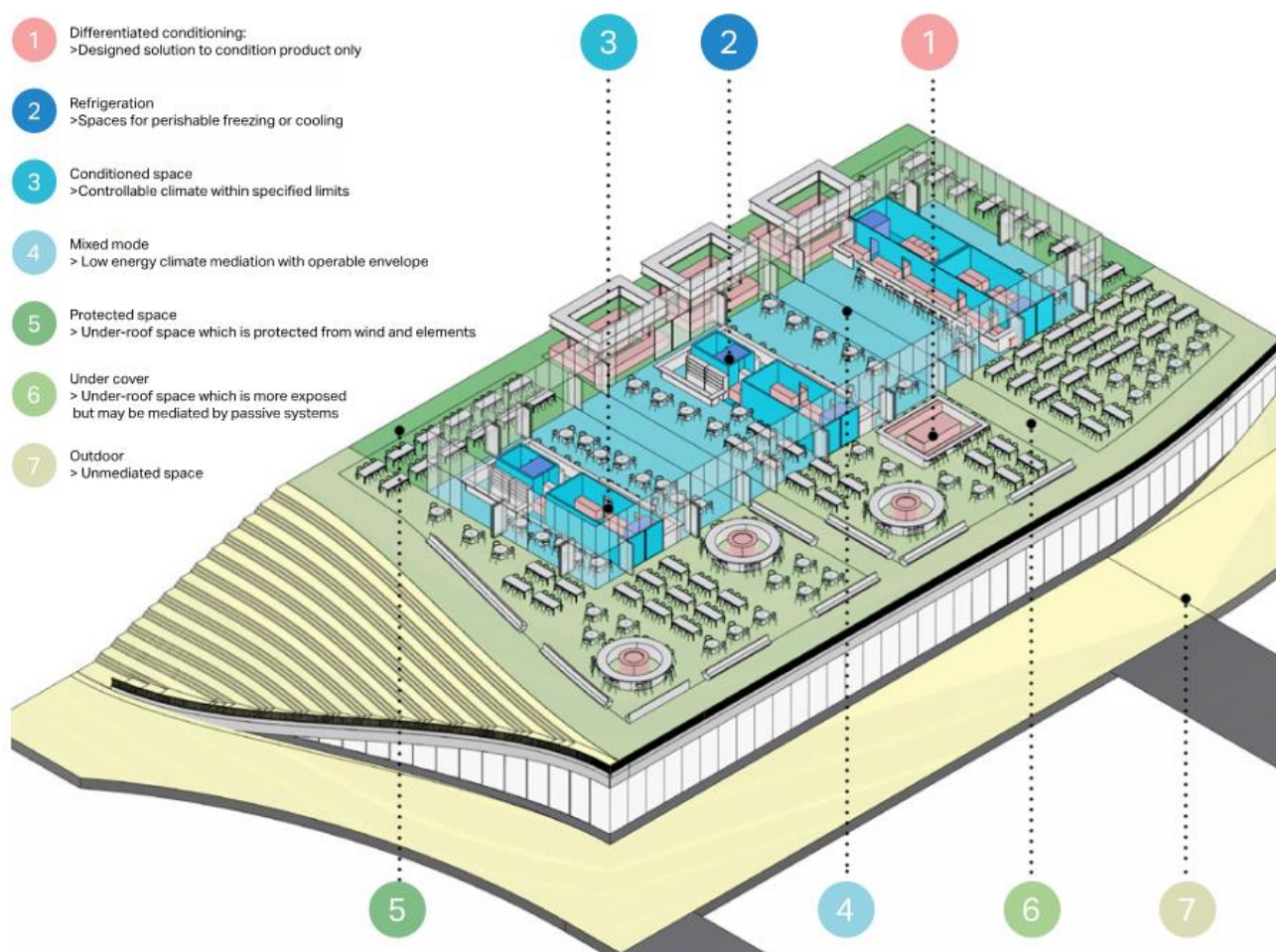


Figure 13 - Micro-Climatic Zones

Based on the various types of micro-climatic zones illustrated above, it can be seen that each zone requires specific treatment, such as maintaining thermal comfort in conditioned spaces within retail areas or provide natural ventilation in more open seating areas. These are discussed in greater detail within the following sub-sections.



# Indoor and Outdoor Environmental Quality

## 9.2 Thermal Comfort

Each of the micro climatic zones will be tailored to ensure the maximum utilisation of passive and low-energy means prior to the implementation of HVAC, and the system will be designed such that under favourable conditions, active air handling systems may be switched off individually without negatively affecting the comfort of the occupants or other environmental mediation systems.

For public areas, comfort will be measured relative the outdoor environment aiming for a perceptible difference which is comfortable according to public expectation of a market.

To achieve this, indoor retail tenancies such as dining areas, cafes bars and restaurants will have mixed mode facilities with the options of: operable facades, passive air conditioning, indirect evaporative cooling, radiant systems and HVAC. Insulation will be implemented in accordance with the NCC, and appropriate shading and high performance glazing will be used in facades.

Air extraction, passive cooling and radiant systems will be used in the main boulevard, live seafood and crate-wash areas in order to avoid losses due to air movement.

Exterior zones which are exposed to the elements may utilise temporary structures to provide cover from the elements (shading and rain protection). During cold periods, these areas may utilise outdoor heaters to provide added thermal comfort.

In order that tenants and the public play an active role in energy monitoring, it is envisioned that a user interface is developed that allows participants to get feedback on their climate control decisions, allowing users to tune the utilisation of energy systems to their financial and environmental benefit. Comparative figures may be represented to the public about energy and water performance according to specific seasons and activities, offering an educational and positive experience to sustainable behaviour.

### Interior Quality Comfort and Authenticity



Figure 14 – HVAC and Ventilated Zones



# Indoor and Outdoor Environmental Quality

## 9.3 Indoor Air Quality

Given that much of the project is exposed to the elements, the ventilation system will be designed in accordance with ASHRAE standards to ensure that entry of outdoor pollutants to enclosed indoor spaces are mitigated. The building form is designed to screen out pollutants and noise along the façade facing Pymont Bridge Road.

Naturally ventilated spaces will receive high levels of air exchange. Conditioned spaces will be provided with sufficient outside air to ensure a comfortable and pleasant user experience.

Another consideration is to ensure that pollutants from cooking processes or vehicles are exhausted directly to the outside. The design of the new Sydney Fish Market ensures that kitchen zones are treated separately to the main retail space and extract directly to the roof.

## 9.4 Lighting Comfort

Where appropriate, lighting will be zoned & designed appropriately to ensure the optimum lighting comfort is achieved. This includes general illuminance and glare reduction in accordance with best practice standards, optimised surface illuminance for building users and localised occupant lighting controls.

Lighting will also be provided in external areas for security during night-time.

## 9.5 Visual Comfort

Given that the development comprises large glazed facades, glare reduction will be achieved through design implementation of fixed shading devices such as large eaves and awnings from the roof. Continuous high levels of natural daylight will also be provided through the glazed roof and facades to minimise the use of artificial lighting. This would also enable facilitation of high quality internal and external views, including Wentworth Park, Blackwattle Bay and the general bay precinct. Views to the surrounding greenery and environmental enhancing vistas would also be enabled.

## 9.6 Indoor Pollutants

As part of the materials selection process, products with volatile organic compounds will either be reduced or eliminated. Paints, sealants, adhesives, carpets, floor and material finishes will all comply with best practice VOC criteria via the architectural specification and design intent. Engineered wood products will be within stipulated formaldehyde limits. Indoor plants will be considered to improve the quality of indoor air.

# Sustainable Design Initiatives

## 10 Sustainable Design Initiatives

### 10.1 General

In pursuit of the ecological design principles, the development will pursue design excellence benchmarked from a number of industry sustainability best-practice sources. These include best practice design initiatives from:

- The NSW Environmental Planning and Assessment Act 1979;
- The NSW Environmental Planning and Assessment Regulation 2000;
- Secretary's Environmental Assessment Requirements (SEARs) items for this development;
- Bays Precinct Sydney: Transformation Plan (2015);
- Rozelle and Blackwattle Bays Maritime Precincts - Master Plan (2002);
- Green Star Design and As-Built v1.2;
- NCC - National Construction Code;
- Sustainable Sydney 2030.

Note the project land is excluded from the applicable area of the below, nonetheless the policies and concepts are attempted to be exceeded insofar as possible:

- City of Sydney Council DCP (2012);
- City of Sydney Council LEP (2012).

Design initiatives under each driver are discussed in the following sub-sections.

# Sustainable Design Initiatives

## 10.2 Environmental Planning and Assessment Regulation 2000

Schedule 2 7(4) of the Environmental Planning and Assessment Regulation 2000 states:

*“The principles of ecologically sustainable development are as follows:*

- (a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
  - (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
  - (ii) an assessment of the risk-weighted consequences of various options,**
- (b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
- (c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
- (d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
  - (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
  - (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
  - (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including Fmarket mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.”**

### 10.2.1 Precautionary Principle

There are no perceived threats of serious or irreversible environmental damage as a result of locating the new Sydney Fish Market on the desired site. The site is a marina and has been expected to develop over time as the city grows to meet the expected growth of the City of Sydney Local Government Area.

It is considered unlikely that there are threats of serious or irreversible environmental damage as a result of the proposed use of the development and activities of its future occupants. The proposed development has predominantly the same uses as the current buildings on the site i.e. existing Fish Market and associated infrastructure. The current building has similar operations and building services to the proposed project and has not created any serious or irreversible environmental damage. Therefore, no serious or irreversible environmental damage is expected due to the operation of the building.

The site selection and proposed use of the project are associated with low risks of serious environmental consequences based on strong similarities with the current building use on the site, i.e. the proposed site is currently operating as a boat jetty with car parking spaces. The new site has been designed to improve on the current operation of the existing Fish Market. The existing site is underutilised and has potential to improve its site ecology. The lack of biodiversity on the current site encourages redevelopment to lift the existing Fish Market up to the Bays Market Standard.

It is considered that the development goes above and beyond accounting for environmental damage by attempting to reduce it with best practice initiatives such as creating green spaces, enhanced biodiversity for landscaping, incorporating micro-climatic design, reducing energy consumption and waste quantities sent to landfill.

Any further concerns will be addressed through development of a Construction Environmental Management Plan that incorporates mitigation measures to ensure that environmental impacts to Blackwattle Bay are minimised during construction.

## Sustainable Design Initiatives

Once the new Sydney Fish Market is under activity, operational guidelines, best practice procedures and appropriate monitoring and control measures shall be defined by the building owner. This will be in accordance to the sustainable strategies adopted by the development, and shall be distributed to the tenants to ensure environmental impacts associated with operational processes are mitigated.

### 10.2.2 Inter-generational equity

The new Sydney Fish Market conserves inter-generational equity through minimising the consumption of resources whilst providing environments which will ensure the health and well-being of occupants into the future. The project will reduce demand for resources – in comparison to building containing NCC deemed-to-satisfy provisions and existing Fish Market – by introducing a number of best practice energy and water conservation measures. These initiatives will free up more resources for future generations, instead of their immediate consumption by the current generation.

As the proposed site is currently in operation as a boat jetty and car parking area, the state of the environment will not be diminished. Rather, the development includes new landscaping that will enhance the environmental quality of the site. The limited diversity of the environment currently on the site will be maintained or improved upon by this project.

The site's runoff is designed to run to sewer and stormwater as appropriate, minimising harm to the Bays Waterway.

All waste streams will be dealt with in ecologically safe methods; waste water and stormwater will be plumbed to the sewers or stormwater drains as required by law. In addition, waste water will be lower for this development compared with a standard practice development as low-flow fixtures and fittings will be used to reduce water consumption throughout the building, and rainwater reuse through collection from the roof will be adopted.

Through a commitment of adopting Water Sensitive Urban Design (WSUD), a monitoring system will record both consumption and demand, rainwater reuse, landscape irrigation, stormwater detention systems and stormwater treatment for improving water quality.

Inter-generational equity is realised in the use of energy and water efficiency measures which aim to reduce the consumption of limited resources, preserving these for future generations. In addition, the design principles outlined in the following sections are for buildings which will be occupied by the next generation. The healthy interior environments which they create will benefit occupants for more than 60 years from today.

The new Sydney Fish Market continues to demonstrate intergenerational equity through actual practices, including:

- Design to handle the development growth and change without the necessity to increase the building footprint, by application of interchangeable modules based on the structural grid, which allows disassembly of components and adaptations according to future use;
- Recycling and upcycling of materials in retail levels;
- Extended life span of the structure, designed to last for minimum 60 years;
- Roof design life to be 50 years;
- Consideration of climate change effects, and designing for the future conditions;
- Modularity of the design, allowing for reduced wastage during fitout and/or tenant changes;
- Careful consideration of materials, water and energy consumption, during all project stages.

## Sustainable Design Initiatives

### 10.2.3 Conservation of biological diversity and ecological integrity

The portion of the proposed site that is currently land-based is considered to have limited biological diversity, being a carpark and boat jetty. However, some aquatic species are present within Blackwattle Bay.

It is considered that the Development enhances biological diversity and ecological integrity through incorporation of more green landscaping in comparison to the existing site, and through water treatment systems.

An education water area is proposed including a living aquatic wall to support marine diversity. It is expected that this would attract more aquatic species to the area as the water and sediments would be cleaner.

### 10.2.4 Improved valuation, pricing and incentive mechanisms

This development considers the integration of a number of initiatives which aim to internalise pollution and other undesirable environmental outcomes.

Contractors are required to provide and abide by an Environmental Management Plan and Environmental Management System which would be in accordance with NSW Environmental Management Systems Guidelines.

Another initiative involves the implementation of rental agreements with retailers that include clauses to ensure that they are committed to abiding by the operation guidelines – containing environmental best practice activities and procedures – which shall be developed by the building owner once project is operating. This aims to minimise any potential risk that may occur as a result of practices that deviate outside stakeholder environmental responsibilities.

The cost to recycle the construction and demolition waste may be borne by the project team. The contractor will be required to achieve minimum 90% recycling of construction and demolition waste, according to Green Star certification strategy. This would have a greater financial cost to the project, however it provides a more accurate reflection of the full life cycle costs of the materials which were on the site, and the waste from the new materials as a result of the construction. The increased cost of recycling construction materials will also incentivise the purchase of less materials, thereby reducing over-ordering and material wastage.

The costs of producing the following pollution: sewage, landfill waste, and CO<sub>2</sub> emissions are partially borne by the project team and accounted for in the project's sustainability initiatives. The project has voluntarily elected to:

- improve water consumption efficiency in order to reduce production of sewage;
- reduce energy consumption through passive design, efficient systems and heat recovery, which will reduce total CO<sub>2</sub> emissions;
- recycle waste streams and recycling strategies to the construction process and to operation of the project, reducing material waste directed to landfill;
- design and functional concept that can adapt to future changes including effects of climate change, increasing population and tourism impacts, changes of surrounding land use, particularly that around the marina area.

# Sustainable Design Initiatives

## 10.3 Bays Precinct Sydney Transformation Plan (2015)

The NSW Government's objectives for the transformation of The Bays Precinct, include the following:

- Deliver enduring, socially inclusive and great places to benefit Sydneysiders and national and international communities;
- To achieve building design excellence and quality urban design in all Destinations;
- To provide ecological and marine water improvements to enable abundant biodiversity;
- To deliver integrated utilities solutions that enable advanced energy generation and technologies;
- To apply integrated planning within a land and water context that considers strategic policy decisions and the interrelationships between biophysical, social and economic impacts;
- Introduce environmental and ecological systems to improve water quality, address ongoing sources of water pollution and encourage public recreation;
- Adopt world-class energy generation systems that maximize efficiency and establish The Bays Precinct as the exemplar for 'big city' energy provision.

To achieve the transformation objectives, seven key actions are proposed to shape The Bays Precinct Transformation Program, including:

1. Divide The Bays Precinct into eight distinct but linked Destinations;
2. Introduce the Bays Waterfront Promenade;
3. Recover and repurpose the White Bay Power Station;
4. Create the Bays Market District incorporating a rejuvenated new Sydney Fish Market;
5. Include Wentworth Park in the program area;
6. Work towards repurposing Glebe Island Bridge; and
7. Introduce water quality initiatives in the Bays Waterways

As one of the seven key actions, the new Sydney Fish Market has been ranked with an 'Immediate Priority' (works commencing 2015-2019) to provide the following features:

- Create a new world-class market food offering and dining attraction;
- Reimagining the existing Fish Market, including wholesale and retail functions;
- Allowing the Bays Waterfront Promenade to seamlessly connect with a bustling and thriving place that brings residents and visitors back to the water;
- Improving access and public transport

The new Sydney Fish Market has been designed with the above in mind. The design presented captures these principles and presents world-leading excellence in its endeavour to lead the world in ecology and sustainability of fish markets.

# Sustainable Design Initiatives

## 10.4 Rozelle and Blackwattle Bays Maritime Precincts - Master Plan (2002)

Section 2.4 of the Rozelle and Blackwattle Bays Maritime Precincts - Master Plan (2002) covers the ecologically sustainable development principles expected to be applied in the precinct developments and activities.

*"[...] The four key principles for the design of sustainable developments and buildings are:*

- 1. To minimise external environmental impacts during their construction, operation and disposal;*
- 2. To minimise resource consumption during their construction, operation and disposal;*
- 3. To provide comfortable and healthy indoor environments;*
- 4. To optimise their functionality and utilisation*

*Each of these key principles covers a range of ESD issues. [...]"*

### 10.4.1 Minimizing external environmental impacts

The site is targeting 45% net reduction of potable water consumption against current industry norms. This includes incorporation of water recycling systems, rainwater harvesting and high performance fixtures and fittings.

As part of the Green Star rating strategy and to respond to the Bays Masterplan, the project is also targeting a 30% reduction in Greenhouse Gas Emissions. This includes 5% of the base building electrical energy to come from on-site production.

The following initiatives will be incorporated into the design to ensure that the energy targets will be met.

- Energy Effective Design and Systems
  - LED lighting throughout;
  - Efficient HVAC units with high COPs will be appropriately designed;
  - Highly articulated conditioning zones that condition product separately to people where possible;
  - Excellent shading through the use of the awning;
  - Use of reflected daylight under roof to achieve ambient levels;
  - Others.
- Energy Effective Policy
  - Retail energy targets for retailers;
  - Use of off-grid power where possible.

### 10.4.2 Minimizing resource consumption

The project aims to increase upcycled/recycled material use, material knowledge and use of healthy materials with the aim of achieving an off-site 25% reduction in Global Warming Potential relative to an equivalent design.

The key approaches to achieve this reduction will be through:

- Dematerialisation to reduce the need for materials
- Material selection of natural materials and from responsible sources
- Implementation of high performance materials
- Design for disassembly to reduce the building's future impact.
- Maximising off-site manufacture for the reduction of operational energy, water and waste
- Ongoing iteration of design to optimise the system

**Design for Future Flexibility:** A core aspect of the new Sydney Fish Market design is to handle growth and change. A modular construction system enables future change to be accommodated as part of the design logic: Structural components including floors and non-essential columns based on interchangeable modules. This allows elements to exchange, and move without being discarded as waste.

## Sustainable Design Initiatives

- Major components of the retail fit-out including façades, security systems, signage and ceiling systems are designed to be interchangeable to ensure the building can adapt to changes in future use.
- Functional roof modules are interchangeable based on mechanical requirements
- Interchangeable components can be pre-produced off-site. Efficiencies in pre-production reduce capex.
- Hydraulic and HVAC services are reconfigurable without changes in structural slabs allowing tenancy variations to occur without major building works.

### 10.4.3 Providing comfortable and healthy indoor environments

The development will ensure comfortable and healthy environments are provided to the occupants, regarding different aspects such as Thermal Comfort, Lighting Comfort, Visual Comfort, Indoor Air Quality, Indoor Pollutants and others. Some of the several initiatives to be implemented are listed below.

To ensure adequate thermal comfort of occupants, indoor retail tenancies such as dining areas, cafes bars and restaurants will have mixed mode facilities with the options of: operable facades, passive air conditioning, Indirect evaporative cooling, Radiant systems and HVAC. Insulation will be implemented in accordance with the NCC, and appropriate shading and high performance glazing will be used in facades.

Continuous high levels of natural daylight will be provided through the glazed roof and façades to minimise the use of artificial lighting and improve visual comfort. Artificial lighting will be zoned & designed appropriately to ensure the optimum lighting comfort is achieved. Given that the project comprises large glazed façades, glare reduction will be achieved through design implementation of fixed shading devices such as large eaves and awnings from the roof.

The ventilation system will be designed in accordance with ASHRAE standards to ensure that entry of outdoor pollutants to enclosed indoor spaces are mitigated. The building form is designed to screen out pollutants and noise along the facade facing Pyrmont bridge road. Sufficient outdoor air is going to be provided to ensure that levels of indoor pollutants are maintained at acceptable levels.

As part of the materials selection process, products with volatile organic compounds will either be reduced or eliminated. Paints, sealants, adhesives, carpets, floor and material finishes will all comply with best practice VOC criteria via the architectural specification and design intent. Engineered wood products will be within stipulated formaldehyde limits. Indoor plants will be considered to improve the quality of indoor air, as will active materials that improve interior air quality.

### 10.4.4 Optimizing functionality and utilization

3XN has approached this project with the goal of creating a new Sydney Fish Market that will serve many purposes when it is finished - a working fish market, an amenity for the city, a cultural destination, an urban connector, and an inspiring icon along the legendary Sydney waterfront.

As a significant community and tourist destination, the new Sydney Fish Market will facilitate interaction by combining public space with an authentic market. As an operating seaport and wholesale market, the new Sydney Fish Market supports these functions in an uninterrupted way. The new Sydney Fish Market goes beyond its immediate role of the sale and distribution of fish, and provides an array of varied experiences that enable change and responsiveness to the future, creating a destination that is an integral part of the city fabric.

The new Sydney Fish Market is an opportunity to diversify the functions and experiential character of the existing Fish Market. The open, flexible structure with injections of nature, education and leisure experiences will allow more visitors to participate in the activities offered by the harbour and the new Sydney Fish Market.



# Sustainable Design Initiatives

## 10.5 City of Sydney Local Environmental Plan (LEP) 2012

It is noted the LEP does not apply to the site of the proposed new Sydney Fish Market. Nonetheless the policies and concepts are attempted to be exceeded insofar as possible.

The City of Sydney LEP has a specific focus on providing ecologically sustainable development through the City of Sydney. In consultation with this community need, the LEP includes specific provisions for developments so they do not have an adverse impact on the surrounding environment. The particular aims of the plan include:

- to support the City of Sydney as an important location for business, educational and cultural activities and tourism;
- to promote ecologically sustainable development;
- to encourage the growth and diversity of the residential population of the City of Sydney by providing for a range of appropriately located housing, including affordable housing; and
- to enable a range of services and infrastructure that meets the needs of residents, workers and visitors.

The new Sydney Fish Market addresses the aims of the LEP through creation of an improved infrastructure that is already a current major tourist attraction, promotes ESD principles through targeting a formal Green Star Rating and providing a range of services including retail, dining, and recreational activities to meet the needs of Sydney residents, workers and visitors.

## 10.6 City of Sydney Development Control Plan (DCP) 2012

It is noted the DCP does not apply to the site of the proposed new Sydney Fish Market, and DCPs do not apply to a State Significant Development. Nonetheless the policies and concepts are attempted to be exceeded insofar as possible.

Part 3 – General Provisions: 3.6 – Ecologically Sustainable Development supports the LEP in the identification of more detailed sustainability planning controls, these include:

*3.6.1 – Energy Efficiency in non-residential developments – Development is to be designed and constructed to reduce the need for active heating and cooling by incorporating passive design measures including design, location and thermal properties of glazing, natural ventilation, appropriate use of thermal mass and external shading, including vegetation.*

*3.6.2 – Water Efficiency in non-residential developments – to reduce the potable water consumption of the building, through a mixture of reduction and re-use*

*3.6.5 - Materials and building Components – Encouraging the use of sustainable and low toxicity materials.*

The new Sydney Fish Market supports the DCP through incorporation of passive design principles such as large naturally ventilated spaces, high performance glazing, adequate thermal insulation of the building fabric, passive cooling through pre-conditioned air from the nearby bay and reuse of ice, wide awnings and optimised HVAC design to name a few design principles to be adopted.

Water efficiency will be addressed through a rainwater collection system. Reduction of energy consumption will be addressed through highly efficient HVAC and lighting system. Materials, finishes and building components will incorporate sustainable materials with low VOCs where possible.

# Summary

## 11 Summary

Ecologically Sustainable Design continues to be a driving consideration in the ongoing development of the new Sydney Fish Market. The new Sydney Fish Market will incorporate a number of ESD initiatives from a self-assessed Green Star Design and As Built v1.2 Rating to complement the initiatives undertaken to reduce the greenhouse gas emissions, potable water consumption and material resources of the site. These have been developed around a response to the *Secretary's Environmental Assessment Requirements* by Department of Planning and Environment.

The ESD initiatives outlined in this report are intended to be used as a design guide for the development. The specific initiatives that will be installed across the precinct will be determined throughout the development application stage for each individual building and will be subject to feasibility analysis, including that of the final use and layout. The initiatives will comply with the guidelines set out by the relevant authorities.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of categories including:

- Energy & greenhouse gas emissions
- Potable water reduction
- Minimising waste to landfill
- The indoor environment
- Occupant amenity and comfort
- Land use & ecology
- Emissions
- Building management

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and the sustainability vision for the new Sydney Fish Market.

## Appendix A – Indicative Green Star Matrix

### 12 Appendix A – Indicative Green Star Matrix

# Green Star - Design & As Built Scorecard v1.2

Project:	The new Sydney Fish Markets
Targeted Rating:	5 Star

Points Available	Total Score Targeted
100	67.0
	60.0

Required for outcome



CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED	ASSESSMENT COMMENTS
Management				14		
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	1	WGE to provide consultancy service. Project is already registered. WGE to host Green Star planning session/workshop with team, and will overview and QS initiatives and documentations during all stages of the project.
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies	Environmental targets (such as water and energy consumption) are being set, adequately documented and maintained throughout project. Specific values still to be defined.
		2.1	Services and Maintainability Review	1	1	S&M Review will be led by Head Contractor prior to construction start, to ensure design is in compliance with commissionability, maintainability, operability, etc. best practice. This will be assisted by WGE.
		2.2	Building Commissioning	1		Not targeted given the requirement for an air tightness test typical façade systems. Given the layout of the building, finding a way to test may be quite challenging. Commissioning and ATT still highly recommended
		2.3	Building Systems Tuning	1	1	A tuning plan shall be developed by head contractor, which will be the responsible for the building tuning process for the first 12 months after occupation, including quarterly adjustments and measurements.
		2.4	Independent Commissioning Agent	1	1	An independent commissioning agent (ICA) shall be engaged for this development. This is due to the complexity of the building services systems, the criticality in the operation of the systems and the performance targets desired. Ensuring the development operates as intended is necessary to ensure a successful project. A representative of the client acting independently of the Head Contractor is able to provide this role.
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	2	A project specific Climate Change Adaptation Plan was developed by project team at the project early stages, where climate change scenarios were assessed, potential risks identified, and appropriate measures recommended.
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	1	Building specific information shall be developed regarding the sustainability elements of the design. This will be delivered to: - Day-to-day users - Retail Tenants - Facility Managers
Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1	Commitment by UGDC, which will track and report results on waste, energy and water consumption of the building. MoU between NFM and Tenants will be likely consolidated.
		5.2	End of Life Waste Performance	1	1	Best Practice End of Life Waste Management shall be demonstrated by providing a formal agreement between the building owner and the tenants. This would work in a number of ways.  - Formal contractual agreement between Tenant and owner, following best practice guidelines such as: o Greening Make Good, o RICS Oceania, or o Better Buildings Partnership. - A Memorandum of Understanding between the parties that agree the requirements that may be used.

Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-	Complies	Accessible metering will be provided to monitor building energy and water consumption and also each Retail Tenancy individually, as well as individual systems where power exceeds 100kW.
		6.1	Monitoring Systems	1	1	Metering will be provided to each Retail Tenancy individually. Further, BMCS will need to be developed to a point that demonstrates a high level of performance and reading. Particularly critical for the refrigeration system. Inclusive of BMCS/EMS
Responsible Building Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies	EMP shall be developed by Head Contractor. This requirement is covered in the Tender specification by WGE.
		7.1	Formalised Environmental Management System	1	1	Contractor will be required to maintain an ISO14001 certification and all subcontractors to adhere to this. This will be achieved through Contractual requirements in the Tender Documentation, reviewed at the tender stage.
		7.2	High Quality Staff Support	1	1	Also a Contractor Requirement. Contractor to promote positive mental and physical health outcomes to site workers - through programs and solutions - and promote education regarding sustainability practices.
Operational Waste	Performance Pathway	8A	Performance Pathway - Specialist Plan	1	1	Operational Waste Management Plan developed for the project, according to City of Sydney waste codes.
		8B	Prescriptive Pathway - Facilities	-		Performance pathway preferred.
Total				14	13	

Indoor Environment Quality				17		
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	1	New, clean ductwork will be provided, and design to be in accordance with SMACNA and ASHRAE 62.1 separation clearances.
		9.2	Provision of Outdoor Air	2		Uplift of 50% for outdoor air rates relative to AS1668 minimum requirements. Unlikely feasible in this scenario.
		9.3	Exhaust or Elimination of Pollutants	1	1	Car park and retail kitchen exhausts to meet code requirements, and printers to have low emissions certificate. This may require an alternate solution, as kitchen exhausts are not provided in enclosed spaces throughout the retail promenade.
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1	Internal ambient noise levels shall be suitable to activity type in the room (code compliance with AS2107:2016).
		10.2	Reverberation	1		May not be possible based on required finishes. Where applicable, project team to check if spaces can be excluded for functional reasons.
		10.3	Acoustic Separation	1		Achieving acoustic separation will be incredibly tough in this project, based on shape of spaces, internal glazed partitions, etc.
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies	Installed light to be flicker-free and address the perception of colour in the space (CIR>80).
		11.1	General Illuminance and Glare Reduction	1	1	Illuminance levels shall comply with AS1680.2. Designed lighting to have glare reduction through baffles, louvres, etc.
		11.2	Surface Illuminance	1		Requires bright surfaces, which is unlikely to be aesthetically achievable given the typology of the space.
		11.3	Localised Lighting Control	1		Impractical due to retail use and functionality of space
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies	Will be achieved mainly through fixed shading devices.
		12.1	Daylight	2		Based on the depth of floorplate and layout this will be near impossible to achieve in Green Star. Even with ceiling light voids as proposed, the diffuse light levels will likely not achieve Green Star requirements
		12.2	Views	1	1	High quality internal views are being proposed to the space, such as exhibition halls, ocean views, etc. WGE to confirm with the GBCA what they will accept as a high quality view in this case.
Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and Carpets	1	1	95% of the applied Paints, Adhesives, Sealants and Carpets (by volume) shall comply with VOC emissions Green Star benchmarks.
		13.2	Engineered Wood Products	1	1	95% of the applied Engineered Wood Products (by area) shall comply with formaldehyde emissions Green Star benchmarks.
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1	There is a potential to be achieved, but given the use and control of the space, it will be hard. To be confirmed through modelling of internal spaces.
		14.2	Advanced Thermal Comfort	1		Given the use and control of the space, this will be incredibly hard to achieve.
Total				17	8	

Energy				22		
Greenhouse Gas Emissions	E. Modelled Performance Pathway	15E.0	Conditional Requirement: Reference Building Pathway	-	Complies	Min. 10% reduction relative to code compliance shall be achieved.
		15E.1	Comparison to a Reference Building Pathway	20	6	6 points represents around 30% Energy Consumption Reduction in comparison to a benchmark building.  The targeted points represents a significant saving and are aspirational, based on leading design principals. Methods to achieve the energy outcome include: <ul style="list-style-type: none"><li>o Improvement in lighting systems (internal and external);</li><li>o Controls of lighting systems;</li><li>o Façade performance increased well beyond Section J requirements;</li><li>o Efficient mechanical systems, with heat recovery systems;</li><li>o Performance solutions to car park areas;</li><li>o Reduction in heating hot water load through selection of FF&amp;E;</li><li>o Use of condensing gas boilers for centralised heating;</li></ul> Requires agreement with the GBCA on the "reference" building being the existing Fish Market Building Specifications. Potential to use existing Fish Market building design values and apportion on a sqm basis.
Peak Electricity Demand Reduction	Performance Pathway	16A	Prescriptive Pathway - On-site Energy Generation	-		
		16B	Performance Pathway - Reference Building	2	2	Shall be achieved and demonstrated through modelling of a reference case and proposed case, mixed mode, lighting controls, etc.
Total				22	8	

Transport					10	
Sustainable Transport	Performance Pathway	17A.1	Performance Pathway	10	5	A Green Transport plan is the preferred methodology for achieving Green Star points under the current design strategy. This will be developed by a qualified professional, and shall carry specific information about intended usage patterns of patrons and retailers.
		17B.1	Access by Public Transport	0		
		17B.2	Reduced Car Parking Provision	0		
		17B.3	Low Emission Vehicle Infrastructure	0		
		17B.4	Active Transport Facilities	0		
		17B.5	Walkable Neighbourhoods	0		
Total				10	5	

Water			12			
Potable Water	Performance Pathway	18A.1	Potable Water - Performance Pathway	12	6	6 points represents a 45% reduction in potable water in comparison to a reference building.  The targeted points represents a significant saving and are aspirational, based on leading design principals. Methods to achieve the energy outcome include: <ul style="list-style-type: none"><li>o Efficient Fixtures and fittings;</li><li>o Efficient selections of appliances;</li><li>o Responsible irrigation systems;</li><li>o Rainwater reuse. A significant portion is anticipated;</li><li>o Excluding the tenancy water uses, per the scope of Green Star;</li><li>o Cooling Tower management and efficient systems, relative to a standard practice building;</li><li>o Potential greywater recycling.</li></ul>
		18B.1	Sanitary Fixture Efficiency	0		
		18B.2	Rainwater Reuse	0		
		18B.3	Heat Rejection	0		
		18B.4	Landscape Irrigation	0		
		18B.5	Fire System Test Water	0		
		Total		12	6	

Materials				14		
Life Cycle Impacts	Performance Pathway - Life Cycle Assessment	19A.1	Comparative Life Cycle Assessment	6	4	These reflects the extent of environmental impact reduction achieved for nominated environmental impact categories, when compared to a reference building. Project initiatives include reduction of total cumulative building materials, application of responsible and environment friendly components, as well as energy efficient systems and materials with low embodied carbon.
		19A.2	Additional Life Cycle Impact Reporting	4	1	Achieved through reporting of building environmental impact under further categories, in addition to those required under 19A.1.
		19B.1	Concrete	0		Pathway above considered the most appropriate one.
		19B.2	Steel	0		
		19B.3	Building Reuse	0		
		19B.4	Structural Timber	4		
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1	1	Achieved through steel source from responsible steel manufacturer, and energy reducing techniques
		20.2	Timber Products	1	1	At least 95% of used timber shall be sourced from forest certification scheme that meets GBCAs list of criteria.
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	At least 90% (by cost) of all permanent formwork, pipes, flooring, blinds and cables used in the project shall meet GBCA's Best Practice Guidelines for PVC.
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3	1	3% of all materials used in the project to meet transparency and sustainability requirements under one of the GBCA recognized best practice initiatives. Options being considered to achieve this include recycled concrete, certified timber for the roof system, etc.
Construction and Demolition Waste	Percentage Benchmark	22A	Fixed Benchmark	-		
		22B	Percentage Benchmark	1	1	Minimum 90% recycling of construction / demolition waste to be diverted from landfill.
Total				14	10	

Land Use & Ecology				6		
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies	Site previously developed and does not contain endangered or threatened species.
		23.1	Ecological Value	3		Not feasible given water body is the benchmark from which we need to improve upon.
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies	
		24.1	Reuse of Land	1		This would be difficult to demonstrate given the original use as a marina.
		24.2	Contamination and Hazardous Materials	1	1	Hazardous waste inspection shall be completed on the existing structure. Any Lead, Asbestos and PCBs to be removed safely from site.
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	1	Awarded based on light coloured roof required. This will reduce energy burden and assist with local heat island effect.
Total				6	2	

Emissions				5		
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	1	Post-development peak Average Recurrence Interval (ARI) event discharge from the site shall not exceed the pre-development peak ARI event discharge. Based on the water reuse proposition to the development, this will most likely be achieved.
		26.2	Stormwater Pollution Targets	1	1	Stormwater pollution targets in line with CoS requirements will be sufficient to achieve minimum two points.
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies	
		27.1	Light Pollution to Night Sky	1	1	ULOR < 5% for external lights, met through compliant exterior lighting design.
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	1	Water-based heat rejection forms part of the development strategy for the building services. As such, there will be a Legionella risk on the project. Appropriate management plans are proposed to mitigate this risk.
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	1	The project team will work to produce the case for low GWP refrigerant plant where safe, available and cost-effective within the design.
Total				5	5	



Innovation				10		
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10		
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.	30B	Market Transformation			
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks		2	1 point - Stormwater Pollution Targets - Reduction targets in line with Column B (City of Sydney requirements). 1 point - Ultra Low VOC Paints
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		5	1 point - Culture, Heritage and Identity 1 point - Financial Transparency 1 point - Marketing Excellence 1 point - Occupant Engagement (surveys of exsiting SFM) 1 point - High Performance Site Office
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star rating tools.	30E	Global Sustainability		4	1 point - Digital Infrastructure - Achieved by installing building public wifi network. 1 point - Quality of Amenities 1 point - Community Investment (Communities tool) 1 point - Integration with Public Art 1 point - Green Cleaning
Total				10	10	

TOTALS	AVAILABLE	TARGETED
CORE POINTS	100	57.0
CATEGORY PERCENTAGE SCORE		57.0
INNOVATION POINTS	10	10.0
TOTAL SCORE TARGETED		67.0