



Figure 2-62. Allianz Arena, Munich

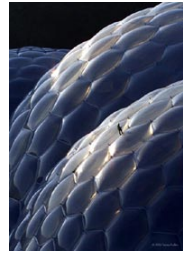


Figure 2-63. Eden Project, Cornwall



Figure 2-64. Extent of ETFE Envelope

2.3.12 Turf

To date no natural grass playing surface has been grown under a covered stadium. Recent retractable roofed stadia have had significant issues in relation to growing and maintaining a natural grass playing surface. These concerns have led to the development of a number of retractable pitch solutions as well as retractable roofs. A palletised turf system is used at Reliant Stadium, Houston and Millennium Stadium in Cardiff and a roll system is used at Telstra Dome, Melbourne to facilitate the removal of the field of play to a more conducive growing environment. More recently technology has been developed to allow the whole field of play to be moved under the stands to grow outside covered stadia such as University of Phoenix Stadium in the USA and Veltins Arena in Germany.

Recent material advances have seen the large scale commercial availability of materials such as ETFE. This material has successfully been used for over 25 years in the construction of agricultural green houses in northern Europe and has recently been used in a number of high profile buildings and stadia such as the immensely successful Eden Project in Cornwall, UK and the Allianz Arena in Germany. The Eden Project saw the use of ETFE in a series of bio domes that were developed to house varying examples of the earth's biosphere with there accompanying plant species. Our research to date, backed up by Vector Foiltec, the leading manufacturer and supplier of ETFE has indicated that the use of the material at Eden Project has been successful and that the enclosed plant species are healthy and sustainable.

The preliminary research into the material indicates that transparent ETFE is the preferred material for the proposed fixed roof, as it allows the majority of UV spectrum through to allow the potential for optimum turf growth. However it should be noted that there is no other similar roof in existence. It is recommended that the growth of turf and pounding that the playing surface will take should be tested by way of a mock up during the next stage. This will assess in detail whether turf will grow to an acceptable strength to enable sports events to be played on the surface. One manufacturer has proposed that they would be willing to manufacture a section of ETFE for such an analysis.

It should be noted that the roof falls from South to North as the Northern stand is lower than the Southern stand to allow for greater light ingress for the playing surface. The new enclosed stadium design along with the data on ETFE was analysed by the New Zealand Turf Institute and their preliminary findings are set out in their letter which can be found in the appendix. In summary they appear satisfied that, based on the information provided to them, it will be feasible to establish and maintain a temperate grass sward of suitable standard within the stadium. It must, however, be understood that these are preliminary comments and further assessment by an organisation such as NZSTI will be required during the concept stage of the project.

2.3.13 Environmental Sustainable Design (refer Figure 2-65)

The stadium development has been designed to allow for rainwater re-use and potentially grey water for irrigation. The orientation and design endeavours to take advantage of natural light wherever possible. The design has limited the need to service all areas through natural ventilation at concourse levels throughout the development at level 01, 02 and 05.

In order to ensure that all aspects of environmentally sustainable design are properly considered in the new stadium development a detailed schedule is being developed based on the 'LEEDS' environmentally sustainable design accreditation system during the next stages of the project (see Appendix).

The schedule provides a basis for considering and evaluating potential environmental initiatives during the design, construction and commissioning of the proposed stadium. This schedule is proposed to be a live document that should be updated during the course of the project.

The schedule should be used to guide the development of the project, evaluate potential environmental initiatives, and potentially rate the environmental benefits of the initiatives and overall environmental success of the stadium redevelopment.

The schedule has been developed to allow it to be tailored to align with environmentally sustainable accreditation schemes such as the LEEDS, Green Star, BREEM and Green Building Council of New Zealand accreditation Systems.

Life Cycle Costing

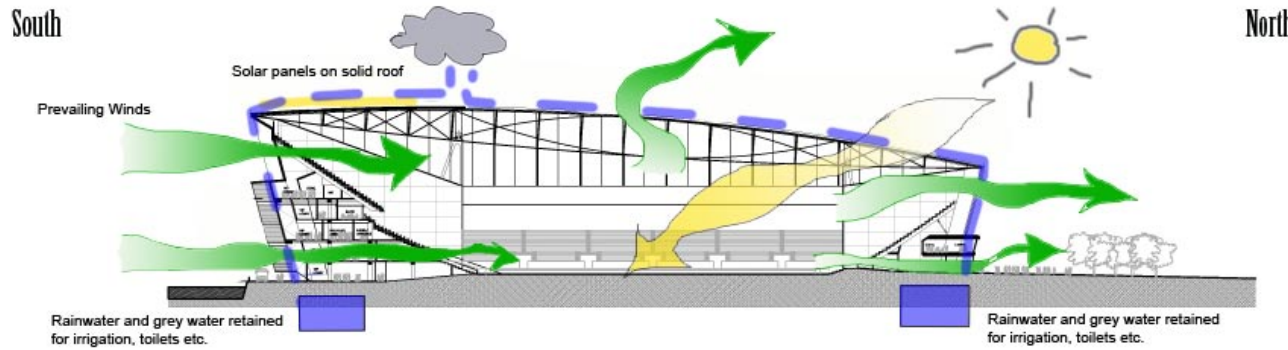
The design and construction of the stadium shall use a lowest life cycle cost (LCC) approach for all major elements.

A life cycle planning procedure will be used for the design. During the development of the design in the next stages of the project, the principles of LCC will be utilised to help optimise the choices of services equipment, sports lighting equipment, finishes, façade materials, and other applicable elements of the project.

An LCC plan for the whole project will be prepared during the design process, and should allow for regular updating throughout the process. The plan will form the basis of the final asset management plan, the operations and maintenance plan (O&M), and any sinking fund calculations if applicable. The plan will include costs of planned capital replacements, enhancements, major periodic maintenance, and routine maintenance and operational costs.

At a minimum, the following LCC evaluations will be undertaken during the design stages of the project:

- Type of floor finish (e.g. carpet, tile, sheet vinyl, rubber)
- Type of ceiling finish (e.g. metal pan, plasterboard, mineral fibre)
- Type of sanitary fixtures (stainless steel versus vitreous china)
- Painted surface (on-going maintenance and re-painting needs)
- Gutters and downpipes (e.g. metal, copper, plastic)
- Service elements (e.g. natural lighting, passive ventilation, air conditioning plant)



- Vertical Transportation (e.g. lifts, escalators)

Facility Life Expectation

The new stadium shall, with reasonable maintenance, be capable of having an operating life of at least fifty years. The Asset Management Plan and O&M manuals and standards will outline how the operating life of 50 years will be achieved.

Energy

The stadium shall be designed and constructed to maximise the use of environmentally responsible materials and processes and to minimise energy consumption and adverse effects on the environment in both construction and operation. The design and construction of the stadium will incorporate principles of Ecologically Sustainable Development.

See Appendix for draft LEED document.

2.3.14 Benchmarking

The recommendations for the development of the new stadium masterplan concept has been benchmarked against current trends in New Zealand, Australian, American, and European stadia.

Benchmarking has been carried out looking at functional requirements to allow the facility to be tested against current and developing trends. The benchmarking exercise has looked at the following key components as outlined in the following table:

- Building area and capacity.
- Uses
- Number of premium seats.
- Number of corporate suites and facilities.
- Number of dining spaces
- Roof coverage.
- Construction cost.
- Car Parking and public transport infrastructure.

Careful consideration has been given to all aspects of stadium operations to ensure that current world's best practices are recommended. The design of the redevelopment of the stadium will create a state of the art facility comparable to Stadium Australia, Sydney, and the Colonial Stadium in Melbourne.

Figure 2-65. ESD Schematic

Benchmark Heights to lowest structure above the Field of Play Comparisons		
Stadium	Uses	Height of lowest structure above the field of play
Cardiff Millenium Stadium Cardiff, Wales	Rugby Union, Rugby League, Soccer, Concerts, Boxing	Approximately 33m
Telstra Dome Melbourne, Australia	AFL, Cricket (ODI), Rugby Union, Rugby League, Soccer, Concerts, Motor Cross	Approximately 24m
Veltins Arena Gelsenkirchen, Gernany	Soccer, Concerts	Approximately 25m
Commerzbank Arena Frankfurt, Germany	Soccer, Concerts	Approximately 25m
Reliant Stadium Houston, Texas	American Football, Rodeo, Concerts	Approximately 53m
Centre Court Wimbledon, England	Tennis	Approximately 17m
The New Stadium Dunedin, New Zealand	Rugby Union, Concerts	approximately 25m



Centre Court - Wimbledon, London



Veltins Arena, Gelsenkirchen



Telstra Dome, Melbourne



Reliant Stadium, Houston



Millenium Stadium, Cardiff



Commerzbank Arena, Frankfurt



Suncorp Stadium, Brisbane



Telstra Dome, Melbourne



Westpac Stadium, Wellington



Lansdowne Road, Dublin



Skilled Park, Gold Coast

Benchmark Comparisons										
Space Type	Suncorp Stadium Brisbane	Telstra Dome Melbourne	Skilled Park Gold Coast	Lansdowne Road Stadium Dublin	Galpham Stadium Huddersfield	Wakato Hamilton Park	Westpac Stadium Wellington	The New Stadium Dunedin		
Sports / Events	Rugby Union, Rugby League, Soccer	AFL, Cricket (ODI), Rugby Union, Rugby League, Soccer, Netball, Motor Cycle	Rugby Union, Rugby League, Soccer, Concerts	Soccer, Rugby, Concerts	Soccer rugby	Rugby	Rugby Union, Cricket	Rugby Union		
Construction Cost	\$224,000,000	NZ \$327,750,000	NZ \$138,000,000	265,000,000 euro	28,000,000 GBP	TBC	NZ \$121,000,000	TBC		
Capacity	52,854	48,708 Rugby 52,209 AFL	25,465	50,746	26,000	27,500 including 20,000 seats (10,000 under cover)	34,900	30,000 including approx. 25,000 seats and 5000 standing under cover		
Number of Tiers	3	3	1 with small corp suite tier on West side	3	2 and 1	2 and 1	1	2 in the South Stand and 1 in North, East and West Stands		
Building Area (sqm)	92,072	107,154	25,750	TBC	24,200	27,500	26,970	56,245 (incl. Bowl, University and Development spaces) 28,835 (incl. Bowl, University and Development spaces)		
Building Footprint (sqm)	42,450	48,350	15,500	TBC	TBC	27,500	26,970	36,476 (incl. development spaces)		
Site Area (hectares)	7.21	7.21	4.8	TBC	Rectangular	Rectangular	Oval	Rectangular		
Field Format	Rectangular	Variable (oval / rectangular)	Rectangular	Rectangular	Rectangular	Rectangular	Rectangular	Rectangular		
Field Size	144m x 90m	170m x 140m	138 x 83m	No	No	No	No	Yes		
Retractable Roof	No	Yes	Yes	No	No	No	No	100% with fixed roof over stands and field of play 95% with roof over stands only		
Fixed Roof	No	Yes	Yes	No	No	No	No	Yes		
Roof Coverage	88%	92 - 100%	80%	TBC	100%	40%	65%	100% with fixed roof over stands and field of play 95% with roof over stands only		
Spectator Group										
General Admission	38,274	38,204	22,843	39,200				31,500		
Club Seating	4,948	4,954	980					2,600		
Club Seating	4,564	8,349	619	10,000						
Corporate Seating	2,800	991	1,360	850						
Wheelchair Positions	260	244	178	230				172		
Companion Seats	280	232	178	178				172		
EAS	280	244	178	230						
Press	52	97	36	236						
Players / Officials / Team	36	36	36	36						
Total	52,854	52,914	25,465	50,746	26,000		34,500	30,000		
Seating Standards										
General Admission	500mm chair x 800mm tread (lower tier) 500mm chair x 825mm tread (upper tier)	480mm chair x 800mm tread	500mm chair x 850mm tread	500mm chair x 800mm tread	500mm chair x 850 tread		480mm chair	500 chair x 825 tread		
Club Seating	500mm chair x 800mm tread	500mm chair x 800mm tread	500mm chair x 800mm tread	500mm chair x 800mm tread	500mm chair x 850 tread			500mm x 850 mm tread		
Corporate	500mm chair x 800mm tread	500mm chair x 900mm tread	500mm chair x 900mm tread	500mm chair x 850mm tread	500mm chair x 850mm tread			550mm chair x 900 tread		
Written Press	500mm chair x 950mm tread	500mm chair x 900mm tread	500mm chair x 900mm tread	500mm chair x 900mm tread	500mm chair x 900mm tread		550mm chair	500mm chair		
Roof Coverage	Roof Coverage: 82%	Roof Coverage: 98-100%	79%							
Corporate Facilities										
Suites	26 x 12-seat suites 18 x 14-seat suites 28 x 20-seat suites 1 x 80-seater hirers suite	34 x 12-seat suites 29 x 16-seat suites 4 x 20-seat suites no boxes	18 x 12-seat suites 6 x 18-seat suites 3 x 18 or 1 x 54-seat hirers suite	12-50 person suites	30 x suites 16 x executive suites			18 x 16 capacity suites 1 x 48 capacity hirer's suite 1 x 120 capacity Founders Club		
Total	73	67	67	35				20		
Open Carrel Boxes	41 x 10-seat boxes 60 x 10-seat boxes	no boxes	62 x 10-seat boxes 18 x 8-seat boxes 20 x 12-seat boxes 100							
Total Hospitality / Dining	101	0	1 x 500-seat Function Room							
Total Dining Spaces	1 x 1,000 seat banquet hall 2 x 600-seat restaurants 2 x 250-seat restaurants 2 x 144-seat terraces 2 x 80-seat seat pool clubs	6 x 500-seat facilities 2 x 1,000-seat restaurants 1 x 1,500-seat facility	1 x 400-seat restaurant 1 x 650-seat restaurant							
Bars / Lounges	2,948	6,500	500 North West Member Bar - 400 standing Function Room Spice Road - 750 standing	1,050	650	628	1,400	1,000		
Timings										
Standards Used	FSADC	FSADC	FSADC/BCA	FSADC	FSADC	FSADC	FSADC	FSADC		
Club Corp	60:40 male-to-female ratios	60:40 male-to-female ratios	60:40 male-to-female ratios			60:40 male to female ratio 70:30 male to female ratio		50:50 male-to-female ratios 1:25 ratio 0-400 1 per 100p, 400+ 1 per 250p 1 per wc, 1 per 5 unimals 0-200 1 per 50p, 200+ 1 per 100p 1 per 2 wc 1 per 10 wheelchair spaces		
Male								Corporate/Members - 60:60 ratio of women to men Public - 40:70 ratio of women to men		
Unimals										
WCs										
WHBs										
Female										
WCs										
WHBs										
PHD										
General Public	70:30 male-to-female ratios	70:30 male-to-female ratios	70:30 male-to-female ratios							
Male										
Female										
PHD										
Guest Services										
First Aid	First Aid - 1 at 50 sqm + 2 at 30	First Aid - 4 at 10 sqm	First Aid - 2 at 15sqm					one counter 'serving' space per 10,000 spectators		
Customer Service Counter	Customer Service - 4 at 20 sqm	Customer Service - 8 at 15 sqm	Customer Service - 1 at 50 sqm					one counter 'serving' space per 10,000 spectators		
Cinema / Kids	ChecheKids Play - 1 at 50 sqm	ChecheKids Play - no	ChecheKids Play - 1 at 50 sqm							
Mothering Stations	Mothering Stations - 2 at 25 sqm	Mothering Stations - no	Mothering Stations - 3 at 25 sqm							
TAB / Betting	TAB / Betting - 2 at 30 sqm	Gaming Facilities - 2 at 30 sqm	Gaming Facilities - 2 at 30 sqm							
Merchandising	ATM machines - 2 at 5 sqm Sports Store - 1 at 185 sqm 5 sales counters	ATM machines - 4 at 5 sqm Main Store	ATM machines - 2 Sports Store - 2 at 20 sqm 2 sales counters			1 x 70 sqm		1 permanent shop		
Food Stands	Sales Counters - 12 at 15 sqm 7.5 m / 1,000 spectators 7.5 m / 2,000 spectators	Sales Counters 5.0 m / 1,000 spectators 5.0 m / 2,000 spectators	Sales Counters - 16 5.0 m / 1,000 spectators 5.0 m / 1,000 spectators		8.0m / 1,000 spectators 4.6m / 1,000 spectators (LGA) 5m / 1,000 spectators (Members)			5 permanent merchandising		
Food Concessions								12.5m/ 2500 spectators 6.0m/ per 2500 spectators		
Bars								approx. 6m/1000 spectators approx. 4m/1000 spectators		
Kitchen	Kitchen/Commissary 2,040 sqm	Kitchen/Commissary 2,352 sqm	Kitchen/Commissary 2,040 sqm					690 sqm 650 sqm		
Main Kitchen / Commissary	2,040sqm	2,352sqm	2,040 sqm							
Finishing Kitchens			500sqm							
Sub Kitchens							250 sqm			
In-subt serventry										
Team Facilities										
Horn Lockers	1 at 400 sqm	1 at 477 sqm	1 at 477 sqm	1 at 350 sqm (incl. warm-up, wet areas)						
Player Lockers	1 at 800 sqm	1 at 865 sqm	1 at 865 sqm	1 at 950 sqm (incl. warm-up, wet areas)						
Aux. Lockers	2 at 170 sqm	2 at 170 sqm	2 at 170 sqm	2 at 175 sqm						
Miscellaneous Lockers	Referee - 2 at 60 sqm Star Dressing - 1 at 60 sqm Star Dressing - 1 at 60 sqm Ballboys - 1 at 20 sqm Cheerleader - 1 at 55 sqm	Referee - 2 at 60 sqm Star Dressing - 1 at 60 sqm Star Dressing - 1 at 60 sqm Ballboys - 1 at 20 sqm Cheerleader - 1 at 55 sqm	Referee - 1 at 60 sqm Star Dressing - 1 at 18 sqm Ballboys - 1 at 20 sqm Cheerleader - 1 at 150 sqm	Referee - 1 at 60 sqm Star Dressing - 1 at 18 sqm Ballboys - 1 at 20 sqm Cheerleader - 1 at 150 sqm						
Doping Control	Doping Control - 1 at 150 sqm	Doping Control - 1 at 150 sqm	Doping Control - 1 at 150 sqm	Doping Control - 1 at 150 sqm						
Ticket Windows	Ticket Windows - 20	Ticket Windows - 50	Ticket Windows - 50	Ticket Windows - 20				Ticket Windows - 10		
Administrative Offices	Administrative Offices - 150 sqm	Administrative Offices -	Administrative Offices -	Administrative Offices - 180 sqm			Administrative Offices - 354 sqm	Administrative Offices - approx. 180 sqm		