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# RUGBY FOOTBALL UNION

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## Sustainability Statement

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Twickenham Stadium – East Stand Extension

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# MAINERASSOCIATES

## Sustainability Statement: Twickenham Stadium East Stand Extension

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## 1.0 INTRODUCTION

This Sustainability Statement outlines all areas in which the newly proposed expansion of Twickenham Rugby Stadium aims to excel in regard to sustainability. In order to demonstrate this to Richmond Council, we have developed this statement using all available technical reports in the following areas:

- BREEAM;
- Ecology;
- Daylight / Sunlight;
- Air Quality;
- Noise impact Assessment;
- Flood Risk Assessment;
- Energy;
- Transport;
- Wider Sustainability within the RFU;
- Community Involvement; and
- Waste.

The Stadium is managed by the Rugby Football Union (RFU). They are responsible for the management and operation of Twickenham Stadium as a venue and brand of excellence as well as for the governance and growth of the sport of Rugby Union in England.

The development includes the expansion and refurbishment of the East Stand to include additional hospitality space. It is important to note that that capacity of the stadium is not being increased.

As part of this sustainability statement, in addition to demonstrating the sustainability credentials of the stadium expansion, we will also highlight some of the work surrounding the stadium undertaken by the RFU.

## 2.0 BREEAM

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's first sustainability rating scheme for the built environment and has contributed much to the strong focus in the UK on sustainability in building design, construction and use. BREEAM is now an international standard that is locally adapted, operated and applied through a network of international operators, assessors and industry professionals. Through its application and use, BREEAM helps clients measure and reduce the environmental impacts of their buildings and in doing so create higher value, lower risk assets.

BREEAM provides a framework that is followed to gain credits under 9 categories: Management, Health and Wellbeing, Energy, Water, Transport, Materials, Waste, Land Use and Ecology and Pollution. Additional innovation credits can be gained for exemplary performance under various credits. Achieved credits are translated into an overall rating, based on which successful buildings are awarded a certificate accordingly. This can be a Pass (30%), Good (45%), Very Good (55%), Excellent (70%) or Outstanding (85%).

The completed Pre-Assessment demonstrated that a BREEAM rating of Very Good can be achieved for the Twickenham Stadium development. During Design- and Post-Construction Stage the development will be assessed using the BREEAM New Build and Refurbishment & Fit-out versions. The Pre-Assessment was completed using these versions, separating the New Built and Refurbished areas of the development. Very Good scenarios were explored with the following results:

- The New Built area achieved 61.5%;
- The Refurbished area achieved 64.95%.

The Pre-Assessment has also outlined a list of additional surveys that will be required throughout the assessment.

## 3.0 ECOLOGY

The Phase 1 Twickenham Rugby Ground Survey was carried out by Francis Hesketh MCIEEM FISC Level 3 on 30<sup>th</sup> May 2016.

### **Buildings**

The East Stand is formed of massive concrete blockwork, with exposed stairwells and stairways. There is an estate maintenance shed which is formed of a single storey of bricks and an upper storey of metal cladding.

### **Hardstandings**

The concourse within the stadium curtilage is formed of bitmac surfacing. A green palisade fence separates the concourse from Rugby Road. Outside the stadium curtilage there are areas of paving and slabs.

### **Trees**

There are seven street trees fronting Rugby Road, including London planes (*Platanus x acerifolia*), Norway maple (*Acer platanoides*) and Myrobalan plum (*Prunus cerasifera*). There are also four small London planes growing within the stadium ownership between the stadium service road and a gravel car park, part of a longer line of London planes planted around the stadium.

These species are not of native origin.

Additionally, at the Local Authority's request, we have viewed the large Oak tree to the North of the site on Rugby Road. This is deemed to have moderate suitability for bat roosting. It is understood this tree will be retained. It is recommended that this tree is protected using Tree Protection Fencing to BS5837:2012 (Trees in Relation to Design, Demolition and Construction) and this is a matter that can be secured by a planning condition.

### **Birds**

No sign of nesting birds was noted during the survey. One crow was seen flying over and landing on the top of the East Stand. Several feral pigeons were noted perching on the East stand, so the possibility of nesting cannot be ruled out.

No nests were present in the street trees.

### **Bats**

The trees were inspected for their bat potential. Most trees are too small and young to support the features necessary for a roost to establish. The two largest London planes fronting Rugby Road are regularly maintained, presumably by the Highways Authority and had no deadwood and no cavities capable of sustaining a bat roost.

As outlined above, we have viewed the large Oak tree to the North of the site on Rugby Road. This is deemed to have moderate suitability for bat roosting. It is understood this tree will be retained. It is recommended that this tree is protected using Tree Protection Fencing to BS5837:2012 (Trees in Relation to Design, Demolition and Construction) and this is a matter that can be secured by a planning condition.

The estate maintenance shed cladding is generally very tightly sealed to the brickwork on all elevations. The cladding has in places been damaged by high-sided vehicles entering the loading bay. There are some occasional small gaps between the cladding and the brickwork but it appears that the gaps do not lead to access to the internal aspects of the shed. No signs of staining or scratching were noted at the few gaps.

Internally, the shed is cladded at ceiling and wall levels with a single skin of insulated material. There is no loft space. There are some Velux roof lights, but no signs of any significant gaps between the cladding and the Velux.

The concrete blockwork of the East Stand is occasionally clad with signs and cosmetic fascia boards. There are few entrance points for any birds or bats and the surfaces (smooth concrete) are generally unsuitable for perching.

The security and inquiries office complex is formed of metal and glass clad walls with no apparent fissures nor loft spaces. There do not appear to be any bat entry points at the fascia. It was concluded that the buildings and trees have no bat roosting potential.

### **Conclusions**

The site has no ecological value. There are no signs of protected species and no features which would support roosting bats.

The street trees on Rugby Road provide some cover for perching birds and may support small populations of invertebrates.

The large Oak tree on Rigby Road should be protected during the construction given its close proximity to the construction compound.

## 4.0 DAYLIGHT AND SUNLIGHT

In order to ensure that the building is implemented focusing on the health and wellbeing of its residents, daylight and sunlight factors are calculated.

The Daylight and Sunlight studies have been undertaken in accordance with the guidance and recommendations set out in the BRE guide (2011). In simple terms, the BRE guide suggests that reductions to existing daylight and sunlight levels should be limited to no greater than 20%.

The BRE daylight tests of Vertical Sky Component (VSC) and No-sky-line (NSL) have been undertaken, with any windows orientated within 90° of due south also being assessed for sunlight by way of the BRE sunlight assessment of Annual Probable Sunlight Hours (APSH).

The scope takes key existing surrounding residential properties into consideration that require consideration from a daylight and sunlight (planning) perspective. These are the following:

- 261-268 Varsity Drive
- 1-12, 15-20 Butterfield Close
- 9-14 Rugby Road
- 3-8 Rugby Road

All other surrounding properties are understood to be in commercial use and therefore in accordance with the recommendations in the BRE guide need not be analysed for daylight and sunlight.

A 3D contextual model was created using the Plowman Craven detailed survey data for all of the relevant surrounding properties, supplementing with site photographs where necessary. Any relevant layout information obtained through research of the publicly available records has also been incorporated into the model, with the remaining layouts assumed based upon external inspection.

The daylight and sunlight results for the existing surrounding buildings can be summarised as follows:

- All of the rooms and windows tested within the existing neighbouring residential buildings will satisfy the BRE guidelines for both daylight and sunlight with the Proposed East Stand Extension in place. This assessment demonstrates that excellent daylight and sunlight availability will be maintained with habitable rooms within the existing residential properties experiencing little or no loss of daylight and sunlight as a result of the implementation of the proposed scheme.



## 5.0 AIR QUALITY

In order to ensure that all policies are complied with, and Air Quality assessment has been conducted.

A Construction assessment will be carried out in accordance with Institute of Air Quality Management (IAQM, 2014) 'guidance on the assessment of dust from demolition and construction' and the London Plan Supplementary Planning Guidance (2014) 'The control of dust and emissions during construction and demolition' guidance. Where appropriate, a scheme of mitigation measures will be proposed.

### **Transport Assessment**

Momentum Transport Planning has undertaken the transport assessment for the project. They have confirmed that the stadium capacity will not increase and no new car parking facilities will be developed and therefore event day transport impacts will not be significant; as a result these have been scoped out from an air quality perspective.

Based on the information received to date on operation phase traffic flows, it was concluded that the impact on air quality would not be significant and has not been assessed further.

### **Energy plant**

A number of options are being explored; one option is to use additional capacity at the stadium's existing energy plant to supply the East Stand extension. In this case there would be no additional energy plant installed but future development at the North and West Stands might be limited unless additional energy plant were installed at a later date. Other options are therefore being investigated, which would involve a combination of ultra-low NO<sub>x</sub> gas fired boilers (up to 4 boilers each approximately 200kW) and a combined heat and power (CHP) engine that would also be gas-fired and with an ultra-low NO<sub>x</sub> design.

If the decision is made to install new boilers and a CHP, these will comply with the emission limits set out by the IAQM/EPUK [Ref2] and the Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance [Ref 19] as well as any additional requirements that LBRUT may recommend. The location of the energy plant and in particular the height and location of flues with respect to surrounding buildings will be situated appropriately to avoid adverse effects on dispersion. On this basis, the impact of the energy plant on ambient air quality at the proposed development site is expected to be negligible and therefore not significant.

### **Current status of assessment**

The AQA has been produced and is undergoing final QA / approval prior to submission. As described above the content of the AQA focusses on the construction dust aspects. Traffic impacts and the energy plant are not assessed in detail.

The initial results of the construction dust assessment indicate that impacts associated with construction activities are considered to be 'medium risk' for dust soiling and 'medium risk' for human health effects. The earthworks and demolition activities are considered to be 'low risk' for dust soiling and health effects.

Based on these risk categories, a scheme of mitigation measures has been defined for the construction phase in accordance with the recommended 'medium' risk measures in the London Plan SPG and IAQM Guidance.

## 6.0 NOISE IMPACT ASSESSMENT

Vanguardia have carried out a noise impact assessment for the development of the Twickenham East Stand. The Noise Report provided a noise assessment of Stadium related noise emissions suitable for planning as well as BREEAM.

Due to the stadium capacity remaining unchanged and the beneficial acoustic measures that are being introduced (such as a sealed façade and relocation of off-site hospitality), it was anticipated that the development would have a negligible acoustic impact.

Plant noise emissions limits were provided for all items of plant to achieve the agreed plant noise emissions limits at the nearest noise sensitive receptors. It was anticipated that the noise limits can be achieved with modest noise control measures.

### **Noise Impact Assessment**

In order to assess the impact of noise from the new East Stand development, guidance was sought from relevant documentation as well as discussions with LBRuT environmental health. 6 noise sensitive receptors were identified that will be most affected by the East Stand development. The main noise sources that may potentially change with the extension of the East Stand on a match day are: traffic noise, patron noise, breakout noise (from stadium bowl and from internal areas), off-site hospitality and mechanical services noises. For each of these scenarios a match-day and a non-match day scenario was considered. (Match-day operations assume 100% occupancy, whereas non-match day operations assume a significantly lower level of attendance). For both, the match-day and non-match day scenarios a negligible impact was demonstrated.

### **Plant Noise Assessment**

In order to achieve the planning and BREEAM requirements, it is necessary for the new plant to achieve different day (57 dBA on a match-day, and 47 dBA on a non-match day) and night measurements (52 dBA on a match-day and 44 dBA on a non-match day).

Plant noise limits were also outlined for the AHU supply or extract terminations, Kitchen supply or extract terminations, Air cooled chiller (based on 2 units), Boiler enclosure walls, Boiler enclosure louvre on both match- and non-match days. These values are to be complied with once the newly proposed plant is constructed.

In additions to the planning requirements, it will also be necessary for the plant to achieve NR55 in any publically accessed external areas within the stadium grounds.

It is proposed to extend the East Stand of Twickenham Stadium to allow for additional internal space for hospitality. There are no proposals to increase the capacity of the stadium. One of the main aspirations of the development is to relocate the offsite temporary hospitality areas to locations within the stadium to improve the match day experience as well as protect the amenity of the local residents in the areas currently affected by off-site hospitality.

## 7.0 FLOOD RISK ASSESSMENT

AECOM has been commissioned to prepare a site-specific Flood Risk Assessment (FRA), to accompany a detailed planning application for the extension of the Rugby Football Union's Twickenham Stadium East Stand, which is situated to the south of the Mogden Sewage Treatment Works at 200 Whitton Road, Twickenham, Middlesex, TW2 7BA.

The application for which this FRA has been prepared comprises of a six storey extension to the east stand, which will provide additional floor space.

The proposed development is located within NPPF Flood Zone 2 and is therefore considered to be at risk of flooding from rivers between the 1 in 100 year (1% annual probability) and 1 in 1000 year (0.1% annual probability) events. The proposed development would be considered as "Less Vulnerable" according to the NPPF and is considered to be acceptable within Flood Zone 2. Further application of the Sequential Test or Exception test is not required.

An assessment of the existing fluvial and tidal flood risk has been made using information available from the Environment Agency Product 4 data, Environment Agency online flood maps, the London Borough of Richmond Upon Thames Strategic Flood Risk Assessment (SFRA), existing site topographical survey, development proposals and records of historical flood events. The report has concluded that the application site lies within Flood Zone 2 in accordance with the NPPF. The risk of fluvial flooding is considered to be medium.

Flooding of the site from the Duke of Northumberland's River is predicted in the 1 in 100 year plus 20% climate change event and the 1 in 1000 year event. Flood depths during these events are thought to be up to 0.1m and 0.3m respectively. These depths are not considered to give rise to significant hazard to users of the stadium facilities. Climate change predications suggest that the site may become located in Flood Zone 3 in the future. Ground levels are not being altered and within the extension on ground level, the new footprint has limited occupied space, consisting of small lobby areas, a lift and turnstiles. Currently the site does not flood in the 1 in 100 flood event (1% AEP). When considering future climate change (at 20%) flooding is predicted to occur in the 1 in 100 year flood event, however this will be to an approximate maximum depth of 100mm. The nature of the development proposals will not create a significant loss of floodplain storage during this event. It is therefore considered that the extension will not increase flood risk to other sites.

Other sources of flood risk have been considered including public sewers, pluvial, groundwater and reservoirs. The flood risk to the site from these sources is considered to be low.

The Flood Risk Assessment has shown that the surface water drainage strategy ensures that all of the surface water runoff from the roof will be discharged to the site's existing surface water network. The current site is comprised entirely of an area of hard standing. The proposed development will not, therefore, lead to an increase in impermeable area.

Although the interception of rainwater will occur at a higher level post development, the impact on drainage will not be significant and the existing regime will be maintained.

Although the proposed development will not increase the flood risk any further than the current level, the RFU must take into consideration repair and long term maintenance of existing flood defences they have responsibility for as riparian owners to protect the whole site from flooding in the future.

Consideration of residual flood risks is required in accordance with the NPPF. There is a residual risk of flooding occurring from the following circumstances:

- Failure of existing flood defences resulting in fluvial flooding;
- Overtopping of flood defences in events in excess of the 1 in 100 year return period;
- An on-site rainfall event in excess of the relevant design standards resulting in flooding from the proposed surface water drainage system;
- Poor maintenance of the proposed drainage systems, which could lead to blockage.

Mitigation of these residual risks can be managed by:

- Providing safe access and egress to Whitton Road to the south west of the stadium;
- Arranging finished surface levels such that designed storm exceedance flows do not cause flooding of the site,
- access road, buildings in the vicinity of the site or other sensitive areas;
- Repair and long term maintenance of the flood defences;
- Long term maintenance of the private drainage systems.

## 8.0 ENERGY STATEMENT

ME Engineers were appointed to develop an energy strategy in support of the extension of the East Stand at Twickenham Stadium.

The energy assessment for the proposed redevelopment of the East Stand was written in response to the London Borough of Richmond upon Thames planning policy, and the more recent framework of the Greater London Authority (GLA) London Plan (March 2015), policy 5.2.

The following conclusions were drawn from the energy assessment:

- The design solutions for the development will endeavour to maximise the provision of passive energy saving measures before considering any active techniques.
- The Principle of 'Be Lean' has continued as the architectural form of the building has developed during this period to achieve as thermally efficient a building as possible without detracting from the architectural character of the stadium. This forms part of the passive design proposals, incorporated to reduce the base energy levels as reflected in the carbon emissions calculated for the stadium.
- The east stand has been modelled to assess the energy consumption using a dynamic energy simulation, and from this the carbon emissions for the Thermally Enclosed has been calculated, and aggregated to give an overall stadium wide reduction of 5.69% over part L from 'Be Lean' measures alone.
- As part of the 'Be Clean' requirement, a CHP scheme outputting 79kW thermal has been assessed. This provisional size of CHP is envisaged to provide for the base domestic hot water demand of the stadium.
- With an overall efficiency of 90% for the CHP unit, and an expected running time of 5,110 hours annually, the calculated saving in carbon emissions due to CHP is 35,760 kgCO<sub>2</sub> per year. Factoring this saving into the 'Be Lean' measures this increases the reduction to 14.35% over part L baseline emissions rates.
- Various renewable technologies have been reviewed for inclusion into the redevelopment of the grounds, as part of the London Plan Energy Hierarchy 'Be Green'. Following this review it was concluded that the potential of renewable energy technologies was extremely limited, and in some cases not viable at all.
- However, it was considered that a PV installation was feasible on the roof of the adjacent south stand, and a 40kWp system was therefore incorporated. The 'Be Green' measures further reduced the carbon emissions by 26,350 kg CO<sub>2</sub> per year, bringing the reduction to 20.73% over part L baseline emission rates.
- The London Plan requires a reduction of 35% of carbon emissions. This means that based on current designs, CHP and PV scheme, the stadium is expected to fall short of this target by 14.27%. This equates to 58,950 kgCO<sub>2</sub> per year.
- When taking into account the actual usage profile of the stadium, the actual carbon emissions shortfall equates to 20,190 kgCO<sub>2</sub> per year.

## 9.0 TRAVEL PLAN

A Transport Assessment has been prepared by Momentum Transport Planning on behalf of the Rugby Football Union (RFU) to support a planning application for the extension of the east stand of Twickenham Stadium in the London Borough of Richmond upon Thames (LBRuT).

The proposed East Stand development comprises of 11,088m<sup>2</sup> GIA of hospitality space to be used for Major and Non-Major Event Days.

The East Stand development will enable the multiple hospitality areas that are currently taking place off-site to be consolidated within the stadium. No additional tickets will be sold to Major Events as a result of this development.

Existing conditions at the Twickenham Stadium including site access; the highway network; public transport accessibility; car parking; and servicing and waste management arrangements were summarised in the Travel Plan. Twickenham Stadium has a PTAL (Public Transport Accessibility Level) rating of 1b, however the south east corner of the stadium has a PTAL rating of 3 due to falling within the PTAL catchment for Twickenham Station.

No new car parking spaces are proposed in association with the East Stand development on-site or off-site. No additional car parking spaces will be used on a Major Event Day and the current car parks have sufficient capacity to cater for any potential slight increase in parking demand on a Non-Major Event Day.

The proposed East Stand development will generate a slight increase in servicing and delivery trips and staff trips on a Major Event Day. Additional staff will travel using public transport or on foot. Delivery and servicing trips will take place outside of peak hours where possible. This increase in trips will have a negligible impact on the local highway network.

All servicing, delivery and waste collection will take place off-street. The East Stand servicing road has a sufficient height and width to cater for and HGV to pass a parked HGV on this internal servicing road. This will ensure that no queuing occurs on the highway network, even in peak delivery hours. An additional waste room is proposed in the ground floor of the East Stand to help accommodate the additional waste that will be created on a Major Event Day at the stadium.

Overall, the proposed Twickenham Stadium East Stand development will have no to negligible impact on the local highway and public transport network.

## 10.0 SUSTAINABILITY AT RFU

The Rugby Football Union (RFU) is responsible for the management and operation of Twickenham Stadium as a venue and brand of excellence, as well as for the governance and growth of the sport of Rugby Union in England. Their ambition is to ensure that Twickenham Stadium remains the premier venue for domestic and international rugby matches, conferences and other major events.

Current RFU Sustainable Development objectives are:

1. Ensure all staff are aware of the RFU's sustainable development objectives.
2. Maintain profitability of Twickenham Stadium to support wider RFU operations.
3. Reduce energy intensity of Twickenham Stadium
4. Reduce waste intensity of Twickenham Stadium
5. Increase site recycling rates to 75%
6. Achieve Zero unsafe behaviours and conditions
7. Gain a better understanding the RFU's impact on the local community
8. Adopt a sustainable procurement model
9. Utilise stadium as an example of sustainable development for new clubs to follow
10. Highlight travel options to the stadium for events

To achieve these targets, management system which identifies the core actions against these targets is required, outlining priorities for action and highlighting opportunities for investment:

- In order to ensure that utility usage is appropriate at the stadium, the RFU aims to engage major stakeholders in the utility management process, identify areas of inefficiency via base load review, follow the Energy management hierarchy to prioritise action (Eliminate Wastage, Increase efficiency, Generate locally) and identify new opportunities of renewable energy types.
- RFU's Waste Reduction and Recovery strategy will ensure that all operations follow the waste hierarchy (Prevention, Reuse, Recycling, Recover other value, Disposal) to prioritise action, engage key stakeholders to ensure transparency, continuously identify opportunities to reduce waste, promote waste reducing/recycling actions to visitors and ensure that waste data is monitored and reported.
- It will be ensured that water usage is monitored and reported in order to improve efficiency by understanding user patterns and identifying opportunities to reduce consumption. Wherever possible, alternatives to potable water use will be explored.
- Transport and travel plans are produced to manage people's accessibility to the Stadium. It will be ensured that appropriate facilities are provided to staff and visitors to encourage alternative transport options, promote green driving and review options for carbon offsetting.
- Close partnership among stakeholders will be established, and the Stadium's impact on local communities and economy is monitored.

## 11.0 COMMUNITY INVOLVEMENT

The RFU recognises the impact that the development of the new East Stand at Twickenham Stadium has on local communities, and believes that local people should be involved in helping shape the environment in which they live. It has therefore engaged PPS Group, a specialist consultancy, to co-ordinate the public consultation and report back on the results. The following actions were taken:

- Formal pre-application meetings took place with officers at LBRuT to discuss the opportunities and constraints of the site and the emerging proposals. Throughout the course of developing the planning application, the RFU sought to meet with key local stakeholders and political representatives to inform them about the plans and give them the opportunity to feedback directly to the project team.
- Pre-application meetings took place with MP, Dr Tania Mathias, and Leader of LBRuT, Cllr Lord True, as well as each of the local sites currently used by the RFU's affiliates for off-site hospitality facilities. Consultation focused on two public exhibitions held in May and June 2016. Members of the project team including the architects, transport consultants and planning consultants were on hand to discuss the scheme with attendees and answer any questions or queries they had. Notification of these events came via a mailout sent to 31,000 local households, as well as press adverts in two local newspapers on 27<sup>th</sup> May: the Hounslow Chronicle and the Richmond and Twickenham Times.
- Dedicated communications channels including an email address and community phone line were established to encourage public participation. Details of the proposals were also included on the RFU's website.
- The first of the events was held on Tuesday 31<sup>st</sup> May 2016 from 5.30pm–9pm and the second on Saturday 4<sup>th</sup> June 2016 from 11am–3pm. Both events were held in the Live Room, Twickenham Stadium, 200 Whitton Road, TW2 7BA, a venue chosen for its availability, size, and ease of access.
- In addition to the public consultation events, a stakeholder preview was held from 4.30pm–5.30pm on Tuesday 31<sup>st</sup> May 2016 at the same venue. A total of 53 residents and stakeholders attended the consultation events and 17 feedback forms were received before the feedback deadline of 20<sup>th</sup> June 2016. Feedback at this stage suggests residents have limited concerns about the proposals. When asked about for comments on the proposed design of the East Stand, the majority of responses were positive (88%).
- Similarly comments on the work of the RFU in the community were mainly positive (63%); however, 38% of comments suggested areas in which the RFU could increase its engagement in the community. 67% of the those who provided feedback on the management of construction raised issues they would like the RFU to address during construction, such as traffic management (33%).
- When asked for any further comments, respondents said that they would like to be kept updated on the proposals and that improvements be rolled out more widely across the stadium.
- The majority of respondents were aged 40-59 (57%) and most were in full time employment (93%). The RFU is keen to ensure an ongoing dialogue with all stakeholders as the application goes through the planning process and as such will keep all communication channels open and interested parties updated in the future.



## 12.0 WASTE

The main aims of the Twickenham Stadium's Waste Management Strategy are to:

- Reduce waste and where waste is produced, to ensure that it is reused or disposed of in the most sustainable manner;
- Provide measures to improve sustainability and reduce vehicle movements where possible.

From these main aims, the following objectives are set:

1. Reduce the volumes of waste produced on site;
2. Increase re-use and recycling to 75% of waste produced
3. Send zero waste to landfill
4. Reduce transport requirements; and
5. Sustainably use existing infrastructure.

### Site Waste Collection

Waste will be put in specific receptacles at the point of creation, currently there are four waste streams in action at Twickenham using a combination of 240L and 1100L Eurobins. Signage will be in place on all Stadium bins, highlighting the available waste streams:

1. Mixed recyclables – Plastic, Metal, Paper and Card (Deployed in all areas)
2. Glass (Only deployed in hospitality areas & Bars where needed)
3. Food Waste (Only deployed in Kitchens)
4. General waste – Everything Else (Deployed in all areas)

All Waste will be taken to the Recycling Compound at the North of the site for segregation and storage.

### Segregation and Storage

The recycling compound in the North of the stadium allows the RFU to actively manage its waste streams by separating recyclable commodities and store them until there is significant volume to making recycling economically beneficial and minimise logistical impact.

The RFU has the following provision within the recycling compound, which will be operated by trained staff:

- 1x 7 Tonne General waste compactor
- 1x 7 Tonne Mixed recyclables compactor
- 1x Bailer and Storage for Plastic and Cardboard Bails

### Waste Removal

Waste streams will be collected from the recycling compound, Waste transfer notes will be verified and countersigned by the cleaning contractor and securely stored by the cleaning contractor.

### Waste Recovery

The remaining wastes, which could not be reused, or recycled should still have significant enough calorific value as to make Energy from Waste (EfW) worthwhile. There are numerous EfW plants in the region and so energy recovery is a practical and cost effective way of diverting Twickenham's waste from disposal in landfill.