Gloucestershire County Council
Residual Waste Project

Javelin Park Energy Recovery Facility

Final Proposal by Complete Circle
November 2011

Contact us

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Engaging with the community

Listening to your feedback

At our first public exhibition from 16-19 July, Complete Circle showed to you our emerging proposal and initial designs for an Energy Recovery Facility to treat Gloucestershire's residual waste.

We thank you for any feedback that you have provided on our design and approach, which we have received and thoroughly reviewed. We have listened to your views and concerns, and incorporated constructive comments, wherever possible, to help shape and develop our final proposal.

Complete Circle has now submitted its final proposal to Gloucestershire County Council in the final tender stage as part of the procurement process.

If selected as the Preferred Bidder, Complete Circle will submit a planning application for the Energy Recovery Facility to Gloucestershire County Council's Waste Planning Authority.

Please take this opportunity to speak directly with members of the Complete Circle team. We welcome your views and will endeavour to answer any questions you may have.

The aim of this second exhibition is to share with you our final proposal, and offer the opportunity for you to provide further feedback. We respect and value local opinions and are committed to building a meaningful dialogue with the community as we progress our planning application.

3D closeup – Entrance view

Please take this opportunity to speak directly with members of the Complete Circle team. We welcome your views and will endeavour to answer any questions you may have.

Complete Circle

Experience and expertise

Complete Circle is based on the successful partnership between John Laing and Keppel Seghers, who together developed the Runcorn Energy Recovery Facility as part of the Greater Manchester Waste Private Finance Initiative Project.

Shanks Waste Management is the operator for the East London Waste Authority, the Preferred Bidder for Wakefield Council, Derby City, Derbyshire County Council and Barnsley, Doncaster and Rotherham Waste PFI contracts, along with a number of other similar contracts.

John laing
making infrastructure happen

- Specialist owner, operator and manager of public infrastructure assets in the UK and internationally
- Delivered over 70 social, transport and environmental facilities across the UK
- Wealth of experience in public private partnerships, project financing, asset management and the operation of public sector infrastructure projects

Keppel Seghers
Solutions for a Cleaner Future

- Environmental solutions provider headquartered in Singapore and based in Belgium with established track record of implementing more than 100 energy recovery projects internationally
- Engineering, Procurement and Construction contractor for this project and will provide operating services focused on lifecycle maintenance and facility optimisation

Shanks
Making more from waste

- International waste management business with extensive operations in the UK, Europe and North America
- Currently manages over 1.5 million tonnes municipal solid waste annually in the UK alone
- Lead operator in the day-to-day management of the Facility

Together, the consortium brings a wealth of professional experience and knowledge of operating safe and highly efficient energy recovery facilities in the UK.

Our final proposal

Green, safe, proven

Complete Circle's proposed Energy Recovery Facility

- Enough capacity to treat 180,000 tonnes per year of residual waste
- Waste tonnage flexibility – able to offset reductions in household municipal waste with third party commercial and industrial waste which will be sourced locally
- Divert at least 90% of biodegradable municipal waste from landfill – estimated by Gloucestershire County Council to help save around £150 million over 25 years
- Generate 100,000 MWh per year of green electricity (sufficient to power up to 20,000 homes) – contribute towards national targets for providing energy from sustainable sources
- Capable of providing renewable heat energy to nearby businesses in the future
- Net reduction of about 26,500 tonnes of CO_2 equivalent per year compared to landfill

Proposed solar photovoltaic (PV) installation

- Projected output of about 38,250 kWh a year of renewable solar energy to offset electricity demand from the offices and visitor centre
- Projected emissions savings of up to 450 tonnes of CO_2 equivalent over 25 years*
- Minimal visual impact – 400-600 m^2 of panels to be mounted on the rooftop of the tipping hall structure
- Will be designed and installed to be eligible to receive paybacks from the UK government's Feed in Tariff, which will be used to help offset the cost of the facility

Section 106 improvements

Complete Circle has been liaising with officers from the Waste Planning Authority and other statutory consultees to identify at an early stage in the planning process what issues may require consideration in a Section 106 Agreement. Although no issues have arisen that any party currently considers will require a Section 106 Agreement, we will continue discussions with all the relevant parties.

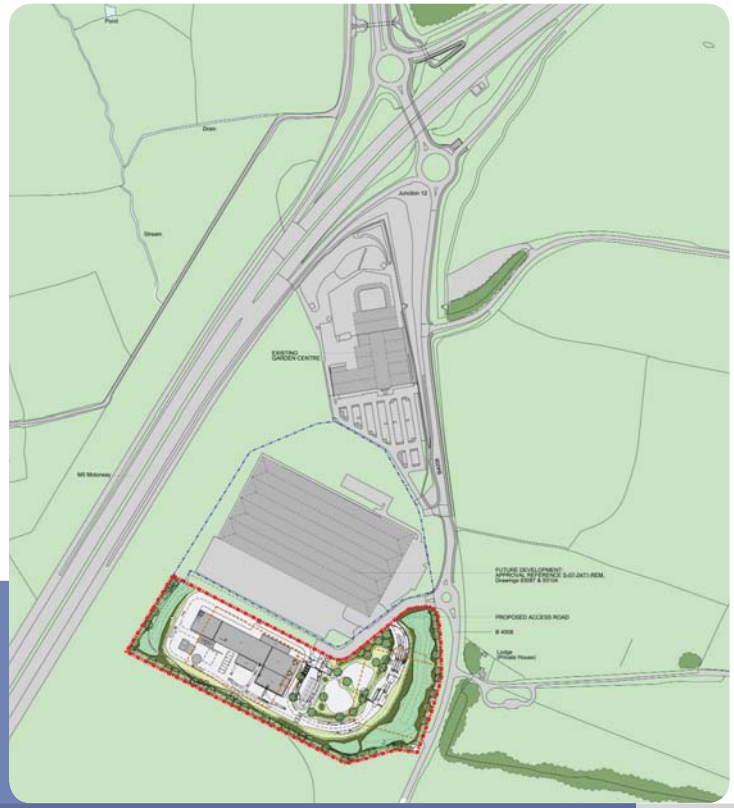
* Depending on rate of decarbonisation of UK electricity supply.

The Site

At Javelin Park

- The proposed Energy Recovery Facility site at Javelin Park is 12 acres (4.86 ha), located approximately 500 metres south east of Junction 12 of the M5 motorway
- The site is identified within the emerging Waste Core Strategy, Gloucestershire County Council's planning policy document containing the vision, objectives and policies for managing Gloucestershire's waste
- Nearest residential dwelling is 46 metres to the east of the site
- Flood Zone 1 (low risk of flooding); is not within a Groundwater Source Protection Zone, is outside all Aerodrome Safeguarding Zones and is not within the Green Belt
- Nearest European designated ecological site is the Severn Estuary Special Area of Conservation/Special Protection Area/ Ramsar Site 6.7 km away. There are no designated ecological sites within 1 km

Sitemap



Designation and Constraints Plan

- At its nearest point, the Cotswold Area of Outstanding Natural Beauty lies about 1.5 km to the south east of the site
- Key receptors, designations and constraints in the wider area (including European conservation designations, flood zones) can be seen on the interactive mapping tool on the Gloucestershire County Council Waste Core Strategy website at http://prow.gloucestershire.gov.uk/website/min_waste/viewer.htm.

Evolution of our design

Fitting in with the surroundings

Recognising that the proposed facility cannot be completely absorbed into its setting, Complete Circle's design strategy to mitigate visual impact has been to develop an architectural aesthetic that minimises the volume, height and scale of the building.

After showing our initial designs to you at the first consultation event and having listened to your feedback, our proposed design and layout has evolved and improved.

Feedback from technical consultees and public stakeholders, including the Design Council and Commission for Architecture and the Built Environment (CABE), has been listened to, understood and has helped shape our thinking in developing the final designs submitted with our bid to Gloucestershire County Council.

The Landscape and Visual Impact Assessment has shown:

- There would be very limited long term impact on the character of the area around the site
- The scheme will provide an opportunity to enhance the landscape that currents exists within the site boundary
- The design of the building has the potential to make this a landmark development
- The proposal is appropriate for the overall character and context of the area, and responds sensitively to the natural landscape setting and neighbouring buildings and industries

3D aerials – viewed from NE and SW respectively

Aerial from North East

Aerial from South West

"a skillfully designed plant...clear and consistent design approach...careful choice of cladding materials... fits seamlessly into the countryside"

Comments by the Design Council and CABE

Key Dimensions

Building footprint: 2.5 ha
Overall height: 48.4 m
Overall length: 142 m
Stack height: 85 m
Overall building width: 27 m – 60 m

Compact design, intelligent layout

Issue raised: Are you making the most of the site?

Action: Optimum site layout

- Comprehensive design review undertaken in response to CABE's suggestion to extend the views of the open countryside. Results of the investigation showed that locating the administration wing and its integral visitor centre on the northern face of the facility was the optimal design
- Air-cooled condensers face towards the M5 to minimise noise impact

Issue raised: Minimise the size of the building

Action: Minimise building mass

- Cut down extravagant sculpting of the building's form from earlier designs
- Avoided curved roofs which reflect sunlight and appear white in the landscape

Issue raised: Have you screened the building as much as possible?

Action: Review landscape screening and greening

- Extensive landscaping and use of vegetation (new native trees and hedgerows) to enhance existing site boundaries and improve natural screening from the south and east
- Earth mounding on the east and western boundaries

Issue raised: Make it sustainable

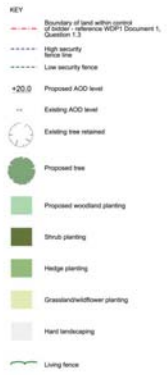
Action: Review sustainable features

- Use of naturally weathering materials and rainwater harvesting
- Creation of a surface water drainage lagoon to reduce the risk of flooding and enhance the attractiveness of the landscape around the facility

Issue raised: Minimise visual impact of the stack

Action: 'Camouflaged' stack

- Minimising height and width to reduce visual impact of stack while ensuring dispersion of released substances are at safe and acceptable levels (based on dispersion modelling studies)



Site plan

Materials, texture and colour

Wherever practical, sustainable materials will be used to construct the facility. Visual impact is a key consideration in selecting the principal cladding material, in terms of:

- Minimisation of light reflection – to prevent the building from appearing brighter within its setting, particularly when viewed from the elevated viewpoints
- Building colour – a 'natural' colour will allow the building to blend with rather than contrast its rural background

Naturally weathering timber

- Majority of the building will be overclad in timber (western red cedar or larch) which will absorb, rather than reflect, sunlight
- Timber will naturally weather down to a silvery grey, which blends with the surrounding landscape, especially when viewed from distance
- Environmentally-sourced timber, certified by the Forest Stewardship Council

Reclaimed bricks

- Orange or red reclaimed bricks will serve as a colour and textured contrast to the timber on the facades of the administration block and other lower levels of the facility

Metal and glass

- The lower levels of the building – its 'plinth' – will be predominantly metal-clad for robustness and to contrast with the timber cladding above it. However, a section of the plinth will be glazed and its large windows will offer views into the ground level of the building and the facility's process equipment

Timber Overcladding

Fire treated Western Red Cedar boards spaced 50mm apart non-weathered and weathered.

Wall Cladding Type D

1. Orange Sussex Handmade reclaimed bricks
2. Red Sussex Wirecut reclaimed bricks

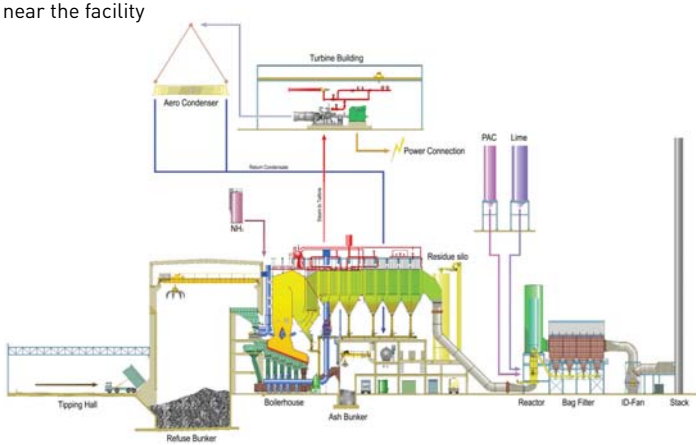
Proven sustainable technology

Our energy recovery process

Keppel Seghers' patented and proven technology has been successfully implemented in more than 100 energy recovery projects internationally.

How energy is recovered from residual waste

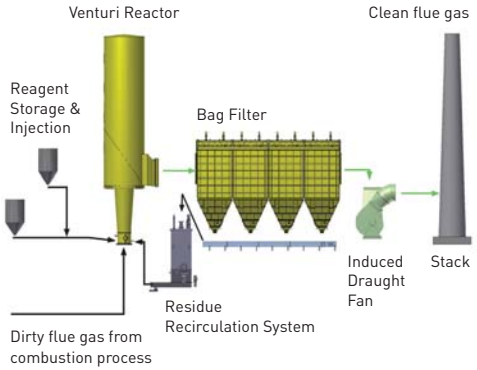
- Residual waste is tipped into a **bunker**. A crane grabs the waste and places it into the feed hopper. The residual waste then drops down a feed chute onto the grate
- The action of the **moving grates** turns the waste to allow it to burn fully
- The resulting **Incinerator Bottom Ash** is evacuated via the ash extractor into the ash storage bunker. This is recovered and recycled for use in the construction industry
- Hot gases produced in the combustion process pass through a **boiler** where heated water becomes steam
- A turbo-generator uses the steam to produce **electricity** for export to the local power grid. The heat produced can also be used for industrial processes or residential district heating near the facility
- The gases from the boiler go through an extensive **flue gas cleaning process.** The cleaned gases are finally released to the atmosphere through the stack
- The **Air Pollution Control residues** are reprocessed and recycled into low carbon cement replacement products through a simple process. The proposed process involves sizing and blending the APC residues with similar materials from other sources



Duty to public health

Managing air quality and emissions

All energy recovery facilities in the UK must comply with the Industrial Emissions Directive, which sets strict emissions limits. Our proposed facility will use Keppel Seghers' state-of-the-art flue gas cleaning system, which effectively removes harmful and acidic gases, dioxins, furans, dust and particulates.



How the flue gas cleaning system works

- Injection of alkali (such as sodium carbonate and lime) to neutralise acid gases
- Injection of active carbon to remove volatile organic chemicals and metals
- Use of bag filters to effectively remove fine and ultrafine particles

Measurements at similar facilities in the UK, Denmark and Italy indicate that bag filters are effective in removing ultrafine particles (also known as nano-particles) so that energy recovery facilities do not make a significant contribution to airborne levels of nano-particles.

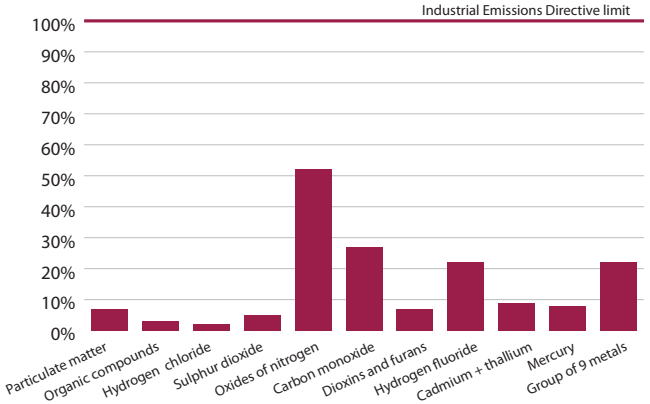
Continuous monitoring

The residual emissions will be strictly controlled and monitored by an advanced Continuous Emissions Monitoring System to ensure no risk to public health and compliance with Industrial Emissions Directive limits.

Emissions data will be published on our project website on a live basis.

Safe for people and the environment

Reference plant emissions



Data sourced from ISVAG facility (Belgium, 2010) and Grimsby facility (UK, 2007).

Air quality

- Complete Circle has conducted a comprehensive Air Quality Assessment to determine what effect the energy recovery facility at Javelin Park will have on air quality
- The Air Quality Assessment showed that all substances that will be released by the facility will either be within standards and guidelines for air quality or will make an insignificant contribution to existing background levels

Human health

- Complete Circle has conducted a Human Health Assessment to determine any potential risk to human health posed by the facility
- The Human Health Assessment concludes that emissions from the facility will not pose unacceptable risk to either residential communities or farming communities identified in the vicinity

Managing and utilising residues

"Modern, well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable."

Advice from the Health Protection Agency, The Impact on Health of Emissions to Air from Municipal Waste incinerators, February 2010

Our proposal will safely capture all the by-products of the energy recovery process – namely, Air Pollution Control (APC) residues and Incinerator Bottom Ash – and employ specialist solutions to treat them for beneficial reuse.

APC residues reprocessing and recycling

- Removed from the site in sealed vehicles and reprocessed off-site by Castle Environmental in South Wales
- Reprocessed for use in low-carbon cement replacement products that can be used in the manufacturing of pre-cast concrete products
- This will not cause any dust emissions on site, and will contribute to reducing the carbon footprint of the cement production industry
- Any remaining unrecyclable residues will be sent to a licensed landfill site

Incinerator Bottom Ash treatment and recycling

- Transported off site in covered vehicles for processing by Days Aggregates in Avonmouth
- Scrap metals will be recovered for recycling
- Recycled ash will be used as an aggregate substitute in the construction industry, for example in road construction

Duty to the environment

Managing traffic and transport

Complete Circle conducted a Traffic Assessment to determine the facility's potential impact on traffic levels.

The outcome of the Traffic Assessment demonstrated that the facility's transport strategy would not have significant impact on the capacity of the surrounding road network either during construction, or while the facility is operational.

This transport strategy ensures

- Dedicated vehicle access and defined delivery vehicle routes during construction and operation
- Only local collection vehicles will use local roads (as is currently the case)
- Sufficient space at the site entrance to avoid queues extending back to the road network
- Transport movements will be programmed to take place at times which will cause minimum disruption to the local community and other local road users i.e. avoiding the morning and evening peak periods where possible

During construction

- Lorry movements restricted to following timings:
  - Monday to Friday 7am–7pm
  - Saturday 8am–5pm
  - Sunday and Public Holidays – Restricted
- Normal construction working hours restricted to:
  - Monday to Friday 8am–6pm
  - Saturday 8am–noon
  - Sunday and Public Holidays – Restricted
- No more that 200 lorry movements per day during concrete pouring
- No more than 100 lorry movements at all other times during the construction works

During operation

- Average number of deliveries per day (including waste deliveries, ash removal and servicing of the plant):
  - Monday to Friday 75 per day
  - Saturday 17 per day
  - Sunday 7 per day

*'Lorry movements' accounts for movements to as well as from the site/facility.

Mitigating noise and controlling odour

Minimising noise

Complete Circle undertook a Noise and Vibration Assessment to determine the potential impact that construction works, operation and traffic movements would have on noise levels.

- The assessment concluded that the long term impacts are predicted to be neutral at the identified sensitive receptors (generally residential properties) during operation of the facility. It also considered that normal operation will not result in significant adverse effects on the surrounding community. Noise during construction of the facility will be controlled in accordance with a Construction Environmental Management Plan, agreed with the Waste Planning Authority prior to the start of construction
- Any noise and vibration associated with the construction and operation of facility will be tightly controlled through the use of defined hours of construction and noise abatement equipment (e.g. screening and site hoardings)
- The majority of operations will be undertaken within the building with the noisier aspects being orientated towards the M5
- Delivery vehicles will be prohibited from waiting within the site with their engines running
- Tools and equipment will be appropriately fitted with silencers/mufflers or sound reduced with acoustic enclosures

Controlling odour

Complete Circle conducted an Odour Assessment, which concluded that odours will not be perceptible outside of the facility. This will be as a result of active odour control measures:

- Regular inspections and odour monitoring around the perimeter and operational areas of the site
- All waste delivery vehicles will be sheeted to minimise odour emissions
- All waste will be tipped from vehicles within an enclosed designated reception
- The tipping hall will be maintained under slight negative pressure to prevent dust and odour emissions. Air from the waste bunker will be used in the combustion process
- Flue gas from the stack is odourless

Preserving and enhancing ecosystems and biodiversity

Complete Circle has undertaken on-site mammal, invertebrate and reptile surveys of the Javelin Park site during 2011. These surveys have been used to assess all potential ecological impacts on the site and surrounding environment.

- The design of the proposed facility has taken into consideration all potentially valuable habitats. The watercourse that runs across the boundary and associated vegetation of identified value will be retained and enhanced in agreement with the Gloucestershire County Council ecologist and other key stakeholders
- The creation of amenity areas and a significant water feature on what is currently vacant industrial land has the potential to enhance the biodiversity value of the site. It will provide new habitat areas where none previously existed which will serve to support, and potentially add to, local wildlife

Complete Circle has used air quality modelling to assess the potential impact of the facility on designated nature conservation sites within 15km of Javelin Park. Modelled levels of substances emitted from the stack were assessed at designated habitat sites in the local area

- The highest modelled air concentration at any European site or Ramsar (wetlands of international importance) site is 0.29% of the relevant critical level. The highest modelled air concentration at any international, national or locally designated site is 0.76% of the relevant critical level
- The highest modelled deposition rate at any European site or Ramsar site is 0.27% of the relevant critical level. The highest modelled deposition rate at any international, national or locally designated site is 0.90% of the relevant critical level
- A contribution of less than 1% of the relevant long-term critical level is considered to represent an insignificant contribution, following the approach set out in Environment Agency guidance. All modelled air concentrations and deposition rates are below 1% of the relevant standards and guidelines

Managing flood risk and water quality

A series of comprehensive mitigation measures have been integrated into the design of the development to ensure that impacts on the hydrological environment are minimised. In addition, measures will be implemented during the operational phase to ensure that potential pollution incidents or extreme events are minimised.

- Complete Circle has also prepared an updated Flood Risk Assessment for the site in accordance with national policy guidance. This assessment takes into consideration the potential implications of climate change, and concludes that:
- The mitigation measures proposed (including a surface water management strategy, finished floor levels, buffer strips and an environmental management plan) will ensure that the proposed development will have no significant impacts on hydrology

Maintaining safety

Eliminating risks and preventing incident

Health and safety of the public and employees is Complete Circle's highest priority. We will eliminate risk and prevent incident wherever possible and comply with stringent safety requirements.

Safety in design

- Segregated site access for lorries and operational vehicles, with vehicle queuing lanes within the site to avoid traffic backing up onto public roads
- Segregated entrances and designated routes and exits for passenger vehicles and cyclists to enhance site safety
- All roofs are 'flat' and have perimeter parapets to ensure safe access for maintenance personnel
- Efficient passive and automatic fire prevention and protection systems

Safety in construction and operation

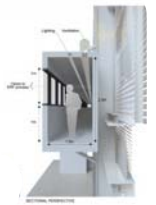
- All of our staff, both permanent and temporary, will be required to undergo comprehensive safety training. All operational managers and supervisors must undergo IOSH (Institute of Occupational Safety and Health) training and Complete Circle's own internal safety management course
- Comprehensive health and safety plans covering the Javelin Park site will be developed, maintained and reviewed annually during construction and operations to ensure the highest level of health and safety

Being a good neighbour

Creating sustainable local benefits

Visitor centre

Visitor corridor



Employment and economic activity

- Up to 300 skilled job opportunities during construction and around 40 during operations
- Recruit staff locally where possible, through local recruitment routes such as job centres, employment agencies, local educational institutions and associations
- Support local economy and commerce through utilisation of local suppliers
- Increase local skills base through apprenticeships and job training

Visitor centre

- Meeting room facilities available for community use
- Promote waste minimisation and recycling through education visits, campaigns, informational displays and an interactive website
- Enhanced visitor experience - glass-encased viewing platform over the waste separation hall for close-up views

Education

- Collaborations with local educational institutions on student research projects across a range of topics relevant to the region's waste issues
- Promote environmental engineering career opportunities to youths through appropriate presentations, workshops and organised visits

Community development fund

- Part of the consortium's corporate social responsibility efforts to support local community projects, charities and volunteer organisations in communities where we operate
- Suitable, local beneficiaries will be identified through discussion with Gloucestershire County Council and a local Community Liaison Group to ensure that the distribution of the grants is driven by local needs and imperatives