



# Construction News

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## HINKLEY POINT C

CN tours the UK's first new nuclear plant in a generation **p16-20**







# Rising power: On site at Hinkley

Construction News takes an exclusive tour of Hinkley Point C to find out what it takes to deliver a project of unprecedented scale and complexity



**PROJECT REPORT**  
PAUL THOMPSON

Head east out of the Somerset town of Bridgwater and you will soon find yourself passing through some very traditional-sounding English villages.

Stogursey, Cannington, Stolford, Combwich: these are communities seemingly untouched by the 21st century.

Yet just a few miles from these havens of English country life, thousands of people are working to build the UK's first new nuclear power station in a generation.

**Project** Hinkley Point C  
**Client** EDF

**Main contractors** Kier Bam (Kier/Bam Nuttall JV) & BYLOR (Bouygues/Laing O'Rourke JV)

Hinkley Point C will use two EPR nuclear reactors to provide around 7 per cent of Britain's total electricity requirement. This is a nuclear project the scale of which has not been attempted in the UK for generations, and just 12 months on from the government finally giving the all clear, it is already a hive of activity.

In the centre of the 175 ha

Hinkley Point C site there are two sections of land labelled, rather matter-of-factly, 'Platforms 31 and 32'. The accurate yet uninspiring labels of these plots belie their importance to the future of UK power generation. This is the location for Reactor 1 of the twin EPR reactors which will be capable of generating Hinkley Point C's 3,200 MWe output.

This is the 'nuclear island' and contractor Kier Bam – a joint venture between Kier and Bam Nuttall – is responsible for preparing the site for the reactors under its £203m earthworks package. Contractor BYLOR – a Bouygues/Laing O'Rourke JV –

will use these islands to deliver the reactor buildings under its £2bn-plus main civils package.

## Vacuum excavation

The nuclear islands – imagine tiered wedding cakes that are irregular in plan – are being constructed in a series of three 4 m-deep tiers, with the slabs for each layer 400 mm thick. The base is stitch-drilled at the radius required and then excavated using vacuum systems, before the rock face is spray-concreted and nailed. Site workers fix copper earthing strips into position across the slab surface.

"There are several advantages in using the vacuum excavators," says Nigel Cann, Hinkley Point C programme and construction delivery director for EDF Energy. "It keeps the noise and dust down for a start, but it also reduces the amount of plant movements and the amount of manual handling."

During the main civil engineering work, a slab cast across the top of the nuclear islands will form the first foundation to the reactor buildings and the base to the

reactor itself. The void – or 'pre-stressing gallery' – between the soffit of the slab and the final depth of the third tier to the island will provide space for the pre-stressing teams that will work on the walls to the reactor domes.

Across the site the team is excavating rock and earth to construct the maze of 'galleries' which will eventually host site infrastructure, pipes, cables and drainage runs. These glorified service ducts are excavated through the bedrock, with the sides stabilised using soil nailing and sprayed-concrete techniques.

Many of the Kier Bam sprayed-concrete team have come to Hinkley directly from the

**"Vacuum excavation keeps the noise and dust down but also reduces plant movements manual handling"**

NIGEL CANN, HINKLEY POINT C

Crossrail scheme in London, so they are well versed in the process. They have installed more than 2,000 soil nails to date across the deep excavation work – a fraction of the overall total, which will see more than 100 linear km of them go in. The nailing teams are using Atlas Copco T35R rigs to install them and open up sections of the galleries for pouring of the nuclear safety concrete.

## Quality control

Some of this nuclear-grade concrete had to be broken out following casting earlier this year due to quality issues, but Mr Cann views this as a small blip and evidence of the rigorous checking system the team has on site.

"There was something like 150 cu m of affected material in the first 60,000 cu m poured; it is a very small proportion," he says. "It has had no impact on the overall schedule of the project and underlines the uncompromising attitude to quality we have developed here."

That stance is reflected in the 3D modelling that has seen the team 'build' the project before it

reaches site. "The nuclear industry has always been a firm believer in the use of computer modelling and BIM; Hinkley Point C is no different," Mr Cann says.

"We are enthusiastic champions. On this scheme there are around 600,000 embedments for bedding plates where the mechanical interfaces with the civil engineering."

"With 3D modelling, we can go over and over the design and construction and make sure we can build those accurately. Not only can it help immeasurably during the design, preconstruction and construction phases, but as managers of the final asset it offers enormous benefits."

This is just one part of the £203m package that Kier Bam has undertaken; there is plenty more happening across the site. The JV is working on the construction of the 700 m-long protective sea wall, installing more than 130 double corrosion protection ground anchors, as well as the excavation of 5.8m cu m of earth and rock – some 1.8m cu m of which will be processed on site.

Those site-won and processed ►



► materials will help reduce the volume of imported aggregates by a significant amount, but the project will still be dependent on materials brought in from elsewhere. In a bid to reduce the impact on the surrounding villages and road network, the project will make the most of its coastline position to bring in material by ship wherever possible, and is building a temporary jetty to do just that.

But such is the scale of the Hinkley Point C scheme that even its temporary works make other civil engineering projects look run-of-the-mill.

## Giant jetty

Where some schemes might be looking at the temporary propping of a concrete slab or the redirection of a stream, here on the Somerset coast, contractor Costain and the rest of the project team is thinking a little bigger.

It is building a huge 12 m-wide, 500 m-long jetty that will jut out into the Bristol Channel, enabling aggregate barges and material-handling ships to dock and unload the huge volume of aggregates, sand and cement needed to construct the power station.

The project team estimates it can import 80 per cent of the scheme's aggregates by sea, with

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each shipload keeping as many as 250 HGVs off the road in the process. "It is very important for us to try to minimise the disruption to local communities, and by building the temporary jetty to import our aggregates we can do that," Mr Cann says.

The jetty features a 12 m-wide roadway that reaches out to a landing head on the seaward side. Here, the aggregate ships will moor and use a conveyor system to unload the bulk materials into the storage silos and bays. These facilities will be able to store as much as 57,000 tonnes of aggregate at any one time to feed the onsite batching plants, two of which are already up and running with the capability to produce more than 2,000 tonnes of concrete per day.

The Costain team is using an eight-legged 32 m x 32 m 'Wave-

Walker' platform to help install the 95 piles that are required for the jetty and its mooring dolphins that the ships will use to secure against the jetty head (see box).

The underlying rock is of the blue anchor formation of green marl and black mudstone, which is bored out to enable an embedment for each of the 95 piles. The deepest embedment is more than 10 m.

The majority of the 33 m-long tubular steel-cased piles have diameters of 1.8-2.7 m and are arranged in pairs as a pile bent with steel bridge beams sitting between them. The mooring dolphin piles are slightly larger at 3.6 m in diameter.

The deck of the jetty will be placed using precast concrete sections spanning between the piles and bridge beams. These will weigh in at a maximum of 15.6 tonnes and are set to be manufactured in Taunton before being shipped round to the Hinkley Point site and offloaded for installation on the jetty.

Work began on the jetty in summer 2016 and, with work continuing 24 hours a day, it is expected to be unloading its first shipments of aggregates by the end of 2018. But with such a huge investment in terms of both time and cash, was there any temptation to make the jetty a more permanent structure and keep it as an asset beyond the construction period?

"Not really," Mr Cann says. "Most of its capacity is taken up in the early years of the construction



The 500 m-long jetty will be dismantled at the project's conclusion

programme. There really will be very little demand for it beyond then. Maintenance costs would begin to outweigh any advantage – it's really not worth it."

So, despite the years of work put into its planning, fabrication, construction and installation, the temporary jetty jutting half a kilometre into the Bristol Channel will be dismantled

## THE WAVE-WALKER

The Wave-Walker platform being used to install piles for the jetty differs from the more traditional 'jack-up' barges in that it can 'walk' around the construction area at as much as 4 m per hour – far quicker than traditional jack-up platforms – and can install piles directly alongside the beachhead without the need for water beneath it.

This enables the team to move the platform regardless of the state of the tide. Given this part of the Bristol Channel has a tidal range of 13 m,

that is an important advantage. "We are exposed to wind and very fast tidal currents, and yet the Wave-Walker has proven to be a stable and highly manoeuvrable piece of equipment," Mr Cann says.

"It does not need the sea to move and means the team can be working more efficiently. It also means that we can work carefully around the foreshore. There are areas of a type of seaweed – Corallina Officinalis – that we need to avoid as much as possible."

and recycled upon completion of Hinkley Point C. Now that is temporary work.

## Worker-town

Away from the jetty, work is progressing on the apartment blocks that will house the army of project staff.

The sheer scale of the Hinkley Point C means its team is having to spend more time on simple logistics than might be expected on any other project. With 25,000 jobs set to be created during its construction cycle and 5,000 workers expected on site each day at peak periods, the team is

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NIGEL CANN, HINKLEY POINT C

investing heavily in its management of project staff.

Among the crucial considerations are how to get workers to site in the first place, how they are cleared through security and on to site, how they are fed and accommodated, and even how they spend their downtime.

Although there are a few small villages dotted around the Hinkley Point site, the nearby town of Bridgwater offers the only real accommodation centre for site staff. Even here though accommodation choices are limited and in high demand. It is anticipated that around two-thirds of the workforce will rent locally or travel in from elsewhere – but that still leaves a substantial number of staff looking for somewhere to live close to site.

In a bid to lessen the impact on local hotels and B&Bs, and to ensure the project can manage the weight of staff numbers looking for accommodation, the

project team has chosen to construct apartment blocks specifically for those working on Hinkley Point C.

Sedgemoor House is located in Bridgwater itself and will provide accommodation for up to 1,000 workers, while the smaller 'Hinkley House' block, which sits immediately adjacent to the site, will provide ensuite bedrooms for 510.

## Creature comforts

There will also be a separate relaxation block that features a bar and restaurant, as well as lounges, quiet areas, a gymnasium and all-weather sports pitches.

"We know we have to make sure the staff here are well looked after; the facilities will be superb," Mr Cann says.

Laing O'Rourke is main contractor for the delivery of the blocks and is closing in on completion of Hinkley House. Located near the entrance to the main site, it looks for all the world

like university accommodation.

The Laing O'Rourke team is using prefabricated units supplied by specialist Nottinghamshire firm Caledonian Modular to build 15 accommodation blocks with 34 ensuite bedrooms at the site.

Each unit is manufactured at the company's base near Newark-on-Trent and transported down to site. On arrival they are lifted off the haulage wagons and stacked into position on the 800 x 800 x 800 mm reinforced concrete pad foundations cast on site.

Mechanical and electrical feeds enter through the riser ducts that are connected once the units are in place. There are no lounges or kitchens in Hinkley House; staff accommodated there will be encouraged to use the restaurant and bars in the entertainment block adjacent to the apartments. Unlike the accommodation units, this is being built using a steel frame with cladding panels and glazing.

Using prefabricated units has halved the installation time compared with traditional build, as well as reducing the environmental impact of onsite construction and lowering the demand for skilled trades in an area where most are being drawn to the main project itself.

"We want to minimise the impact of our work on the local community," Mr Cann says. "We knew the accommodation units needed to arrive on time so that our growing workforce didn't take up the local B&B accommodation for visitors to the area."

"Many of our workers will be away from home for extended periods of time. We want to be able to offer them as much comfort as possible. Hinkley House and Sedgemoor House allow us to do that."

Like the rest of the Hinkley Point C project, the scale and quality of the accommodation and post-work facilities are pushing the boundaries for UK construction.

## Get more online

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# 'The best job in UK construction'

The man behind the delivery of the UK's first nuclear power station for 20 years reveals why he is undaunted by the colossal task at hand

Nigel Cann is running a little behind schedule. That's okay. As Hinkley Point C programme and construction delivery director for EDF, he is entitled to have more demands on his time than most.

As it happens it's only a matter of minutes before Mr Cann arrives. Just enough time for a coffee before a tour around one of Europe's largest and most complicated construction sites.

Mr Cann splits his time between the main EDF project offices in Bristol and the Hinkley site a few miles down the road, preferring to oversee the scheme

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first hand whenever possible.

"The Bristol office is ideal for meetings," he says. "It's central and easy enough for people to get to and from London and elsewhere, but I try to be out on site twice a week."

## State of flux

It's not surprising Mr Cann feels the need to be out and about. The project is in a state of constant flux, with engineers and staff swarming over the work areas. A week spent away from site and the landscape rapidly changes.

And then there is the pressure to deliver. The eyes of the world are on Hinkley Point C, with the output from the completed scheme set to become the backbone of the UK's nuclear power supply for many years. It isn't a challenge he shies away from.

"Is it the best job in the world? Well I don't know about that, but certainly I've got the best job in

the nuclear industry – and the best in UK construction," he says.

Mr Cann has been at the helm of the project as it has ploughed its way through a two-year public consultation, a four-year approval process for the reactor design, plus various planning permissions, permits and challenges.

Having spent five years battling red tape and various planning and funding hurdles, he is relishing watching the project progress and emerge from the vast 175 ha site.

## Skills legacy

"This job is without doubt the culmination of my career," he says. "These schemes do not come along every day and to be involved in a project of this magnitude in [a sector] where I have spent my entire working career is a real privilege. This industry has been good to me and I would like to help bring in the next generation of nuclear expertise."

The numbers seem daunting. Around 25,000 people will be involved in delivering the scheme, with more than 5,000 expected on site each day at its peak.

Mr Cann is hopeful that future nuclear industry managers will be within that group. With 76 apprentices already on site, and the scheme projected to account for at least 1,000 apprenticeships during the build, there is no doubt Hinkley Point C offers that level of potential.

"We are very focused on making sure this delivers long-term employment opportunities and tangible benefit to the local area beyond its construction," Mr Cann says. "We have introduced various apprenticeship schemes and I'll be just as proud that we have played a part in the development of those careers as I will when the plant is completed and producing electricity."

## Dealing with criticism

Too long to build, too expensive, too dangerous, too disruptive, too inefficient – all of these are labels that have been thrown at the scheme.

"We are only human; no one likes to be criticised," Mr Cann says. "Most of those doing the criticising have a set opinion and you can't change their minds. On a personal level I don't let it bother me but it's those out on site that I feel sorry for. They are doing some fantastic things out there and they should all be proud of the work they are doing."

He points to some of the road and infrastructure improvements that will be carried out under the guise of the Hinkley Point C scheme and the extra cash injection to the local economy the project brings.

"There are bypasses around local villages, long-term employment possibilities and existing businesses have benefited. Our catering supplier for instance is a local company. Already they are helping to prepare and deliver 650,000 meals every month for us."

While the scale of the challenge at Hinkley is clear, so too is the pride taken among its top team.