

Construction Methodology Statement

1. Introduction

- 1.1. Chapter 5 of the Environmental Statement – Demolition and Construction and the associated appendix has indicated outline principles and best practice guidelines for the construction delivery of the Northfleet Harbourside project.
- 1.2. The construction solutions and methodologies and has been further developed. This document augments the original document within the Environmental Statement.
- 1.3. The Northfleet Harbourside project is a sufficient size to allow for a holistic and considered construction methodology to inform the design and construction at the outset of each individual element.
- 1.4. The project size allows for a consistent set of principles to be developed which consider the following key aspects: -
 - The use of Offsite Construction and Modern Methods of Construction (MMC)
 - Utilising a consistent “kit of parts” across the development, which allows for innovation, investment and better value, whilst allowing designers flexibility to produce designs responding to each plot characteristic.
 - Early Supply Chain Engagement.
 - Combining Logistics and Deliveries for the whole project.
- 1.5. This approach is aligned with the UK Government approach to procuring public works as outlined in the Construction Playbook, updated in September 2022 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1102386/14.116_CO_Construction_Playbook_Web.pdf)
- 1.6. The benefits of this approach are: -
 - The kit of parts approach allows for standardisation without limiting Design Teams capability for creating designs which respond to the different characteristics of each plot.
 - Faster programmes (assembly, installation, concurrency)
 - Build value construction.
 - Higher productivity.
 - Better control of quality and Health and Safety by embracing off-site manufacture within factory conditions
 - Fewer trade dependencies.
 - Early supply chain engagement allows for the most efficient solutions regarding products, detailing and installation are incorporated into designs at the earliest possible stage.
 - Reduction in waste (process waste and resource)
 - Enhanced Sustainability Metrics working towards Net Zero Carbon
 - Targeted social value
 - MMC factories may be in more deprived areas.
 - Consistent use of products and processes throughout the site allows for investment and innovation with surety of pipeline for 7 years.
 - Consistent and well understood construction methodologies that are applied across the project.
- 1.7. The following report contains the following: -
 - 1.7.1. Review of MMC solutions and opportunities
 - 1.7.2. For each different construction type, a high level design/construction methodology.

1.7.3. Identified potential logistics and delivery enhancements associated with the proposed solutions and the size of the scheme.

2. MMC Solutions and Opportunities

2.1. The scheme, as currently detailed, has been reviewed to assess the viability and methodology of MMC solutions.

2.2. To ensure that the benefits of MMC are realised there are key elements which need to be identified and understood.

2.2.1. MMC solution must be right for the specifics of the site.

- Each site and building construction category is different and requires a carefully considered approach. There is no “one size fits all” for the use and selection of MMC solutions. It may be that MMC solutions are not even suitable for the project.
- Clients/Building operators may have specific requirements and the solution will need to be tailored accordingly.
- Supplier relationships are crucial – the right supplier for the right project must be selected and a long term relationship developed.

2.2.2. Understand the solution selected.

- It is crucial that each solution and supplier is carefully reviewed to understand the design, manufacturing, financial and commercial constraints with each supplier and solution prior to selecting a specific supplier.

2.2.3. Integration of the solution

- The benefits and limitations of the selected solution must be understood to ensure that the other elements of construction required to deliver the selected MMC solution are delivered in a timely and efficient manner.

2.2.4. Early engagement

- The selected methodology should be applied to the design from the outset – potentially even at 1:1250 stage to ensure the most efficient design process and the knowledge of MMC supplier is fully leveraged to deliver the most efficient scheme.

2.3. The following solutions have been considered for the Northfleet Harbourside project: -

Solution	Project size	Flexibility	Embedded Carbon	Extent of MMC
Volumetric	Large	Low	Timber framed solutions are low.	Fully finished offsite.
SIPS Panels	Medium and Large	Medium	Timber – Low	Kit of parts put together on site. Fit out install on site.
Light gauge steel frame	All	Medium	Steel, but lightweight and recyclable. Medium	Kit of parts put together on site. Fit out install on site.
Precast concrete frame and facade	High rise	Low-Medium	Medium to high depending of the factory location. Exposed concrete surfaces improve thermal mass and in-use carbon.	Panelised system. Kit of parts.

Package rooms (e.g. Bathroom pods, Utility cupboards)	High volume	Low	Reduced waste	Used in conjunction with other solutions as “kit of parts”
CLT Timber Frame	Up to medium rise	High	Excellent	Panelised or framing system.

2.4. Following the process outlined above ensures that Northfleet Harbourside will be able to fully realise MMC benefits, are efficient in design process, minimise embedded carbon in construction as well as operation.

3. Kit of Parts Design Guide

- 3.1. Standard methodologies have been identified for each construction category. These methodologies would then be developed into a full system kit of parts during the early design works at the next phase.
- 3.2. This design guide represents the proposed new build construction methodology solution for a range of building typologies. It will remain a work in progress with development and learning providing feedback and subsequent improvements. The guide represents a response to the current legislative and commercial background and will be subject to change.
- 3.3. There are key principles which are to be considered throughout the next design phases.
- 3.3.1. Design to consider safety throughout aiming to reduce inherent risk through the design phase, specifically: -
- Minimise working at height.
 - By design, eliminate need for scaffold.
 - Minimise the requirement for manual handling
- 3.3.2. Design for Manufacturing and Assembly
- Consider constraints and knowledge imparted by supply chain.
 - Design for buildability.
- 3.3.3. Design for carbon minimisation
- Embodied carbon contained within the design is to be tracked and reported from the outset.
 - Products and solutions achieving lower carbon values should be prioritised.
- 3.3.4. Standardisation
- Standardisation must not be imposed or allowed to impact on design quality. Instead, standardisation will be used to: -
- Maximise component use where no value added otherwise.
 - Reduce complexity.
 - Utilise the same building components as advised by supply chain where possible.
- 3.3.5. As part of the early design phase, we will look to standardise various elements across the development – for example: -
- Bathroom layouts.
 - Utility cupboards
 - Lift/core sizes and layouts.
- 3.3.6. Foundations
- Wherever possible, insitu ground beams should be utilised for foundations.
 - Where ground is poor, consider the use of stabilisation or vibro pile solutions.

- If no other foundation is suitable, utilise bored piles.
- 3.3.7. Slab on grade
- Insitu reinforced concrete or Spantherm product
 - Cut and fill balance to be achieved on site.
- 3.3.8. Main structure dependent on solution selected.
- 3.3.9. Façades
- Panelised system with brick slips as a primary finish.
 - Relief in façade to be capable of being formed in panelised system wherever possible.
 - Façade to achieve Class A2-s1, d0 or better even where the building is less than 11m high.
 - Allow for joints in façade at horizontal and vertical grid locations as a minimum.
 - Ventilation from MVHR system to be incorporated into head of window.
 - Small sections of external wall are generally to be avoided.
 - Balconies to be post fix slide on type.
 - No balconies to be inboard of façade line – introduces thermal issues, compromises ceiling heights and detailing.
- 3.3.10. Roof
- Flat roof to be of same construction type as typical suspended floors. Keep soffits horizontal and create falls in top surface.
 - Parapets formed as part of structure as early as possible to avoid temporary guardrails.
 - Where parapets cannot be formed by permanent structure, detail permanent parapet/balustrade so that it can be fixed inside temporary guardrails.
- 3.3.11. Internal walls
- Walls generally to be formed by plasterboard to metal frame.
- 3.3.12. Doors
- No of door size and types to be standardised to no more than 4.
 - Door heights are to be 2100mm.
 - Front door to be FR60 PAS24
- 3.3.13. Bathrooms
- Bathroom pods are to be utilised wherever possible,
 - Bathroom design should be considered as standard across the project allowing for economic use of pods on all plots.
- 3.3.14. Sprinklers
- Required throughout the building to the latest BS 9251-2021.
 - Pipework to be in CPVC.
 - Tanks to be incorporated within the development boundary..
- 3.3.15. Distribution
- Risers to be consistent in size and standardised where possible.
 - Risers to be constructed with metal flooring incorporated during the structural installation.
 - Letterbox entry to each residential apartment to be the same – including the dimensions of all service elements – this allows for a standardised fire stopping detail.

3.4. Construction category 1 – 2-3 Storeys Traditional house build

3.4.1. Sector: Residential

3.4.2. Height: 2-3 storeys

- Summary: Offsite manufactured, panelised or volumetric modular.

- A key factor to decide which solution is preferred is the number of homes to be provided of this construction category per phase.
- The numbers of 2-3 storey build within the Northfleet Harbourside project are insufficient to allow for a fully modular solution to be utilised.
- The selected option is a panelised timber frame solution utilising Cross Laminated Timber.

3.5. Construction category 2 – Up to 5 storeys

3.5.1.Sector: Residential

3.5.2.Height: Up to 5 storeys (Top floor less than 18m above GL)

3.5.3.Summary: Panelised LGSF. External walls to be delivered to site minimise on site works.

3.5.4.Structure

- 3.5.4..1. Light gauge steel frame
- 3.5.4..2. Primary members in LGSF, with metal decking and lightweight concrete infill for floors.
- 3.5.4..3. Structure will consist of LGSF wall elements contained within the dividing walls between apartments and the external façade build up.
- 3.5.4..4. Structure achieves 60 minute fire rating with minor additional fire board additions.
- 3.5.4..5. Hot rolled steel sections are to be avoided.

3.5.5.Stairs and Landings

- Stairs to be metal.
- Stairs to be designed to suit temporary handrail.
- Length, width, rise and run to be standardised as much as possible.
- Stair flights span landing to landing.

3.6. Construction category 3

3.6.1.Sector: Residential

3.6.2.Height: 5-10 storeys (Top floor less than 30m above GL)

3.6.3.Structure Fire Rating required 90 mins

3.6.4.Structure

- Reinforced concrete insitu slab.
 - 3.6.4..1. Slab to be designed to 250mm to allow for 40mm rebate in bathroom pods locations.
 - 3.6.4..2. Hot rolled steel sections are to be avoided.
 - 3.6.4..3. Reinforced concrete insitu blade columns.
 - 3.6.4..4. Columns need to be incorporated into party wall zones.
 - 3.6.4..5. Maximise repetition and stacking, transfer slabs are to be avoided.

3.6.5.Stairs and Landings

- Stairs to be precast concrete.
- Stairs to be designed to suit temporary handrail.
- Length, width, rise and run to be standardised as much as possible.
- Stair flights span landing to landing.

3.7. Construction category 4

3.7.1.Sector: Residential

3.7.2.Height: Beyond 10 storeys (above 30m)

3.7.3.Once above, say 15 storeys, height dictates a completely scaffold free façade solution.

3.7.4.Precast concrete structure and façade preferred option.

3.7.5.Alternative solutions (e.g. solution identified for construction category 3) need to be installed from the inside with only MEWP/cradle access to the outside for minor works (e.g. mastic/finishing.)

3.7.6.Structure

- Precast concrete
 - 3.7.6..1. Floors to be precast planks will likely be 200mm depending on the spans. 75mm structural screed topping required.
 - 3.7.6..2. Hot rolled steel sections are to be avoided wherever possible, though likely to minimise the extent of the concrete walls.
 - 3.7.6..3. Structure achieves 120 minute fire rating – any hot rolled steelwork requires intumescent painting.
 - 3.7.6..4. External façade panels will be pre-insulated precast concrete sandwich panels utilised as structure to support the precast concrete planks.
 - 3.7.6..5. Dividing party walls between apartments will be solid precast concrete structural walls (likely 200mm thick)
 - 3.7.6..6. Maximise repetition and stacking, transfer slabs are to be avoided.
 - 3.7.6..7. Hot rolled steel sections are to be avoided.

3.7.7.Stairs and Landings

- Stairs to be precast concrete.
- Stairs to be designed to suit temporary handrail.
- Length, width, rise and run to be standardised as much as possible.
- Stair flights span landing to landing.

3.8. Construction category 5

3.8.1.Sector: Stadium

3.8.2.Structure

- Precast concrete
 - 3.8.2..1. General structure – terracing, raking beams, walling, stairs and circulation areas.
 - 3.8.2..2. Car parking structure to be fully precast concrete (columns and planks flooring)
 - 3.8.2..3. Tunnel construction forming the route for the diverted roads – Precast concrete structure to be considered.

3.8.3.Roof

- Hot rolled steelwork likely to form main structure.
- CLT roof to be considered.
- Roof to be panelised wherever possible to minimise working at height.
- Construction methodology regarding the pylons to be considered at the outset of the design phase.

3.8.4.Cores

- Cores and walls will be constructed in solid precast concrete panels.
- Cores should be standard throughout the project to enable repetition of wall units.

3.8.5.Stairs and Landings

- Stairs to be precast concrete.
- Stairs to be designed to suit temporary handrail.
- Length, width, rise and run to be standardised as much as possible.
- Stair flights span landing to landing.

3.9. Construction category 6

3.10. Sector: Infrastructure

- 3.11. Road infrastructure will be designed to the Design Manual For Roads and Bridges.
- 3.12. Detailed design will be reviewed and agreed with the relevant local highway authority.
- 3.13. Utilities infrastructure will be designed in conjunction with the relevant Utility authority.

3.14. Construction category 7

3.14.1. Sector: Commercial

- Generally to BCO standard guide incorporating the key criteria update issued Feb 2023.
- Structure
 - 3.14.1..1. Steel frame buildings with insitu metal deck.
 - 3.14.1..2. CLT timber will be considered.
- Where possible, the façade will be constructed of a unitised system, reducing the requirement for working at heights.
- Whilst many of the products utilised in the residential schemes will not always be appropriate for use in the Commercial buildings, the intention would be to use the same manufacturers (e.g. British Gypsum for all drylining and ceiling products across the project)

3.15. Construction category 8

3.15.1. Sector: Retail

- 3.15.2. Steel framed structures.
- 3.15.3. Mezzanines to be formed from LGSF.
- 3.15.4. Retail will be completed to a shell and core to allow for fit out by the end user.

3.16. Construction category 9

3.16.1. Sector: Healthcare & Community

- 3.16.2. The solution will depend on the end user and the exact nature of the building.
- 3.16.3. For example, a healthcare building designated as outpatients will be capable of being completed as a modular building. This may not be suitable for other healthcare/community uses.

Phase	Plot reference	Maximum Height AOD (m)	Building Type	Primary Building Construction category
1	1	24.32	Stadium	Construction category 5

1	2	21.92	Retail	Construction category 8
1	3	55.42	Commercial	Construction category 7
1	4	71.42	Commercial	Construction category 7
1	5	71.42	Commercial	Construction category 7
1	6	23.42	Residential	Construction category 2
1	7	39.42	Residential	Construction category 3/4
1	8	39.42	Residential	Construction category 3/4
2	9	55.42	Residential	Construction category 4
2	10	55.42	Residential	Construction category 4
2	11	71.42	Residential	Construction category 4
2	12	71.42	Residential	Construction category 4
2	13	55.42	Residential	Construction category 4
2	14	55.42	Residential	Construction category 4
1	15	39.42	Residential	Construction category 3/4
1	16	71.42	Residential	Construction category 4
1	17	71.42	Residential	Construction category 4
1	18	71.42	Residential	Construction category 4
1	19	39.42	Residential	Construction category 3/4

4. Construction

- 4.1. The original report included in Appendix 3 of the Environmental Statement is a comprehensive document for the current stage of the design.
- 4.2. Whilst each plot will be considered as its own separate project, the size of the development represents an opportunity to create a logistics strategy on a project-wide basis.
- 4.3. As an overarching principle, the kit of parts will be developed to allow for a consistent set of construction methodologies to be applied through the project.
- 4.4. Consolidated Logistics, Office and Welfare

- 4.4.1. We will consider a consolidated logistics, office and site welfare compound which will be positioned within the confines of the site boundary to ensure it can remain in position for as long as practical.
- 4.4.2. The office and welfare will combine into a centralised space for all the project sites. This will allow for a more permanent and dedicated facility as it will be expected to be in place for 5-7 years.
- 4.4.3. The location of the consolidated centre will be considered in detail at the next stage in conjunction with the Highways team, but will take into consideration: -
- Easy access to the external road network,
 - Central enough to be close to most of the plot locations,
 - Available to the site wide project for the longest duration.
 - Minimising disruption to existing stakeholders, new stakeholders and the wider area.
- 4.4.4. However, an initial review has identified the proposed Power Park as a potential location for the consolidation centre. The space between the existing access to Seacon wharf and the new proposed road construction is approximately 0.5 Ha. and has the following benefits: -
- It can remain in place following clearance of the existing site from the outset of the programme until the end of the scheme.
 - It is directly adjacent to the existing Seacon Wharf, which enables the potential benefits of river transport to be fully explored.
- 4.4.5. It is directly adjacent to part of the new roadways to be installed. Satellite welfare, including toilets, will be required for each construction activity, but this will be minimised. Particular attention will be given to the construction of the Stonebridge Road/Lower Road roadway construction as this occurs early in the project and is relatively remote from the potential centre.
- 4.4.6. Consolidating the logistics centre to one location allows for: -
- Minimising the number of deliveries to the site by combining deliveries for multiple sites into the fewest number of deliveries. This would only be fully leveraged with the use of a “kit of parts” solution.
 - Consideration of using electric vehicles to move materials around the Harbourside scheme.
 - Ensuring all separate plots are serviced adequately and efficiently whilst minimising the external highway.
 - Increased innovation and investment in the logistics centre (e.g. digitisation, stock tracking, just-in-time deliveries to plots)

4.5. Infrastructure Installation.

- 4.5.1. In principle the existing road network will remain in place until the proposed road network is completed, with the only works required to the existing highway the connections.
- 4.5.2. Specific traffic management measures will be developed during the next phase for the works required at each connection location.
- 4.5.3. The revised junction to Galley Hill Road/Stonebridge Road will require the most consideration with detailed discussions required between contractor and Highways authority. These discussions can only commence once a highways contractor is appointed. Minimising disruption and maintaining access will be a key constraint.

4.6. Phase 1/Phase 2 provisions

4.6.1. During Phase 1, the following provisions for access to existing business will be as follows: -

- Businesses to NW of application area – via existing roads until new roads constructed.
- Business to North (Seacon Terminal) – via existing access until new road construction installed.
- Businesses contained within Phase 2 will be as the existing access provisions (Stonebridge Road Roundabout and Grove Road)

4.6.2. During Phase 2 construction, the main sensitive receptors will be the new Phase 1 buildings.

4.6.3. The use of the Consolidation centre could be maintained, as this will have been in place for many years.

4.6.4. Alternatively, the phase 2 plots could be serviced from the existing access via Grove Road. It is likely that the lorry movements will be reduced from the existing.

4.6.5. The control of impacts from the construction site (e.g. noise, dust) will be as per the indications in the appendix 3 to the Demolition and Construction chapter of the ES.

4.6.6. It is not envisaged that any of the impacts of construction will be substantially different from any other construction site. Indeed with the MMC/kit of parts approach we would expect the impacts of construction to be minimised to the best performing level of the industry.

4.7. High Voltage Power Lines

4.7.1. There are several documents which provide guidance on working adjacent to Power Lines.

- HSE Guidance document GS 6
- National Grid TGN 87

4.7.2. Consultation will be held with the Statutory Authority at the outset of the next phase to commence the process of the detailed procedures to allow for working beneath the high voltage cables.

4.7.3. The principles will be to: -

- Avoid the risk and work away from the towers wherever possible.
- Where work beneath the towers is unavoidable (e.g. demolition of existing buildings beneath the towers): -

4.7.3..1. Consult with the statutory authority on the nature of the work and the nature of the towers.

4.7.3..2. Confirm if the works can be undertaken without the towers being live.

4.7.3..3. Identify a safe method of work and confirm the method of work with the Statutory Authority prior to the work taking place.

4.8. Consideration will also be given for the following elements which could be consolidated for the site wide project: -

4.8.1. Investigating the use of local suppliers to support delivery of the scheme. This includes “Meet the suppliers” events as well as direct engagement with businesses currently located on the site and directly adjacent.

4.8.2. Builders Merchant – an agreement with a local builders merchant for consumables across the project should be considered.

4.8.3. Offsite manufacturing facilities could be located in the area and where possible within the confines of the site owing to the size and timeline of the project.

- 4.8.4. The use of local suppliers and contractors wherever possible allowing for training and investment in people from the local area.
- 4.8.5. Local Plant hire – A project wide plant hire agreement with a local supplier will be considered. This would allow for increased investment and opportunity for the local area.
- 4.8.6. Local labour – The project requires an extensive labour force over the course of many years. Given the shortage in labour in the construction industry, it is unlikely that sufficient skilled labour exists in the local market. We will consider project wide training and excellence centres for various key trades.
- 4.8.7. Deliveries by water – Given the proximity of the site to operating wharves and the use of MMC/kit of parts, there is an opportunity to consider the use of water transport methods to bring materials to site. This will be considered during the next phase.