6 Construction

6.1 Introduction

6.1.1 This chapter describes the construction process including the enabling works, dredging, land reclamation, construction and demolition works and other key activities that will be undertaken prior to completion and operation of the full Development. It also provides an indicative programme for the construction works and proposed phasing and timing.

6.1.2 This chapter has been prepared by Quod in conjunction with the Applicant and the project team. Information on enabling, demolition, lake dredging works, land reclamation and construction works may be subject to modification following appointment of a Principal Contractor(s). For this reason, the EIA is based on reasonable worst-case assumptions as set out in this chapter and the collective experience of the EIA consultant team with similar projects.

6.1.3 It should be noted that this is a descriptive chapter. Assessments of construction stage effects of the Proposed Development are provided in each technical chapter of this ES (i.e., Chapters 7 to 10). Each technical chapter also assesses the cumulative impacts of construction of the Proposed Development in conjunction with other schemes in the vicinity.

6.1.4 This chapter is supported by the following appendices:

- Appendix 6.1: Outline Construction Environmental Management Plan (CEMP) Including:
  - Annex 1: Detailed Construction Logistics Plan (CLP);
  - Annex 2: Draft Construction Method Statement (CMS); and
- Appendix 6.2: Construction Phasing Drawings.

6.2 Programme of Works

6.2.1 The indicative delivery programme for the Proposed Development is estimated to be approximately 14 months. Enabling works are anticipated to commence in the third quarter ('Q3') of 2024 and overall construction works to be complete by the end of Q3 2025, subject to securing planning permission and other consents and licences.

Construction Stages

6.2.2 Given the nature of the Proposed Development, the overall construction phase is split into separate phases for descriptive purposes as follows:

Enabling Works:

- Site Preparation.
- Site Access Road.
- In-lake works:

- Phase 1a - Deployment of floating reedbeds to create initial protected areas.
- Phase 1b - Deployment of floating reedbeds in accessible locations.
- Phase 2 - Place caissons[1] in preparation for island formation.
- Phase 3a - Removal of islands and reprofiling of Island 2 to create muddy pond and artificial sand martin colony.
- Phase 3b - Fill caissons (using material from removed islands).
- Phase 3c - Fill – Island formation (using material from removed islands).
- Phase 4a - Enabling dredge to clear way for main dredge.
- Phase 4b - Main dredge of lake.
- Phase 4c - Peninsula extension / land reclamation.
- Phase 5 - Future Ecological Enhancements (including placement of floating reedbeds associated with new islands).

Construction:

- Main Works and Peninsula.
- Canal Bridge.
- Demolition of BSC.
- Future Ecological Enhancements.

6.2.3 Careful consideration of the spatial phasing and the timing of works has been at the heart of the construction programme development due to the ecological sensitivity of the Site and the surrounds (as set out in Chapter 2: Site and Setting). Critically, in-lake land reclamation and dredging will only be undertaken within the months of September - November as this is the least sensitive period for both breeding and over-wintering birds.

6.2.4 Further detail on specific ecological mitigation measures are provided within Chapter 7: Biodiversity and Appendix 7.4: Draft Mitigation and Ecological Management Plan (MEMP) Volume 1 and Appendix 7.5: Draft Mitigation and Ecological Management Plan (MEMP) Volume 2 Parts A-D. The enabling works package upon its completion will provide screened areas of the Site, reducing the visual impact of the construction works on the lake and its bird population.

6.2.5 Whilst details regarding future construction are not finalised at this stage, it is possible to provide a level of information about the expected construction activities which is considered sufficient to allow significant environmental effects to be identified. Table 6.1 provides the anticipated start dates, finish dates and duration for the key phases of construction associated with the Proposed Development.

[1] Cassions are large watertight chambers, from which water is kept out by air pressure and in which construction work may be carried out underwater.

Table 6.1: Indicative Construction Phase Activities and Programme

Construction Phases	Start	End
1) Enabling Works – Site Preparation	**Jun-24**	**Jul-24**
1) Enabling Works – Site Access Road	**Jun-24**	**Jul-24**
1) Enabling Works – In-lake Works Phasing	**Aug-24**	**Nov-24**
Phase 1a – Deployment of floating reedbeds to create initial protected areas	Aug-24	Aug-24
Phase 1b - Deployment of floating reedbeds in accessible locations	Aug-24	Aug-24
Phase 2 – Place caissons in preparation for island formation	Aug-24	Sep-24
Phase 3a – Removal of islands & reprofiling of island 2 to create muddy pond and artificial sand martin colony	Sep-24	Sep-24
Phase 3b – Fill caissons	Sep-24	Sep-24
Phase 3c – Fill – Island formation	Sep-24	Sep-24
Phase 4a - Enabling dredge to clear way for main dredge	Sep-24	Sep-24
Phase 4b – Main dredge of lake	Sep-24	Nov-24
Phase 4c – Peninsula extension / land reclamation	Sep-24	Nov-24
3 – Construction – Main Works and Peninsula (including demolition of BSC)	**Dec-24**	**Aug-25**
4 – Construction – Canal Bridge	**Dec-24**	**Feb-25**
5 – Future Ecological Enhancements (including placement of floating reedbeds associated with new islands)	**Dec-24**	**Nov-25**

6.3 Existing Operational Uses and Occupation

6.3.1 The northern half of the lake is currently used by Broadwater Sailing Club (BSC) which has approximately 180 members. BSC has an existing clubhouse on the northern bank of the lake. Further details of the existing BSC operational use are provided in Chapter 2: Site and Setting. The BSC will continue to operate within the lake throughout the construction period. Demolition of the existing BSC building will not occur until the end of the construction programme to enable the new building to be constructed and fit for use. This ensures a continual use of the lake by BSC and anglers users.

6.4 Description of Works

6.4.1 The following sections provide an overview of each construction stage, including enabling works, construction and demolition works for the Proposed Development. Further information on each stage is provided in the Outline CMS (Annex 1 of Appendix 6.1: Outline

Construction Environmental Management Plan). A detailed CMS (or CMSs, depending on the phase of the works and works packages) will be prepared and submitted to LBH for approval once a Principal Contractor has been appointed.

Enabling Works – Site Preparation

6.4.2 As appropriate to each stage of the works, the Contractor will be required to ensure the necessary consents and approvals have been obtained from the relevant authorities.

6.4.3 Pre-commencement surveys will be undertaken in line with recommendations presented within ES Chapter 7: Biodiversity, Chapter 8: Water Resources and Flood Risk and Chapter 9: Ground Conditions and Contamination. These will include:

- Pre-demolition asbestos survey of remnant site buildings and structures – this will be undertaken on any structures that are to be removed as part of the Proposed Development to identify Asbestos Containing Materials (ACM) requiring regulated removal off-site by specialist licensed contractors;
- Further site investigation including boreholes will be required prior to the development works immediately north of the peninsula where it is proposed to extend the peninsula and construct commercial structures; and
- Implementation of water monitoring measures.

6.4.4 Environmental Permits will be required to cover the works associated with the Proposed Development and are likely to include; Waste Framework Directive (EPR Schedule 9 – Waste operations and materials facilities), the Landfill Directive (EPR Schedule 10 – Landfill), Mining Waste Directive (EPR Schedule 20 – Mining waste operations) and Groundwater activities (EPR Schedule 22 – Groundwater activities).

6.4.5 Land reclamation associated with construction of the extended peninsula will be subject to an Environmental Permit to be secured under the Environmental Permitting (England and Wales) Regulations 2016[1].

Hoarding, Acoustic Fencing and Visual Fencing

6.4.6 The site will be secured with hoarding erected at the site entrance from the site access road. Permanent fencing will be erected around areas of quicksand identified to address health and safety concerns and to prevent any unauthorised access. Appropriate fencing would be erected around the boundary of construction areas with fencing to protect sensitive features.

6.4.7 The woodland habitat on the peninsula will be protected from accidental damage during construction works through fencing which will be installed at the start of enabling works, as set out below. This would provide a physical barrier between the peninsula access road and would prevent accidental damage to woodland or individual trees in this area during construction and from operational activities.

6.4.8 Further details of measures proposed to protect existing trees and woodland are provided in Appendix 10.6: Stage 1 and 2 Arboricultural Impact Assessment Report.

6.4.9 To minimise noise and visual disturbance to breeding woodland birds, a designated feature of the SSSI, a 2m visual and acoustic fence will be installed around the woodland, slightly

inset behind the tree line. This would be installed prior to the commencement of construction Stage 4 which comprises main construction works on the peninsula and ahead of the bird breeding season before the programmed works (i.e., before March 2025). Details of the design, installation methodology and timing of implementation of the visual and acoustic barrier around the woodland would be set out within a landscaping plan for the Site which will be secured by condition.

6.4.10 A site boundary fence will be erected during the construction stage (approximately 1.5km) to provide visual screening during the construction works.

Utilities

6.4.11 Enabling works to utilities and any further infrastructure and services required by the Proposed Development (as described in Chapter 5: Description of Development) would be carried out.

6.4.12 A Utilities Report has been prepared and submitted to accompany the planning application. The Utilities reports discusses the recommendations for the utilities infrastructure to support the Development as follows:

- Retention of the existing HV electrical supply at its rated 500kVA;
- Installation of a new water supply across the canal on a gantry in from the Broadwater Lane mains network;
- Connection of a fire hydrant to the Broadwater Lane supply;
- Installation of the telecommunications and data services from the Broadwater Lane DP across the Grand Union Canal;
- Installation of a suitably rated solar PV generator with battery energy storage system;
- Installation of a lake water source heat pumps; and
- Installation of a pumped sewage system with attenuation buffer and impervious containment.

6.4.13 Pipework and utilities to be laid in trenches below ground and distributed across site in the required locations as per the drawings.

Construction Compounds, Site Office and Welfare Facilities

6.4.14 During the enabling phase suitable facilities will be installed for construction site offices and welfare facilities. These will be in place until such a time as the site accommodation units are installed and become functional. Welfare facilities will be implemented to the southeast of the peninsula adjacent to the site parking area. A second welfare facility will be located adjacent to the substation in the east of the Site. All managers/operatives will be given an instruction prior to being given access to the Site.

6.4.15 The location of the van / contractor parking will be located on the existing hard standing as the most appropriate surface to support vehicle movement on the site. The contractor will encourage the workforce to vehicle share where possible to limit vehicle movement on the site.

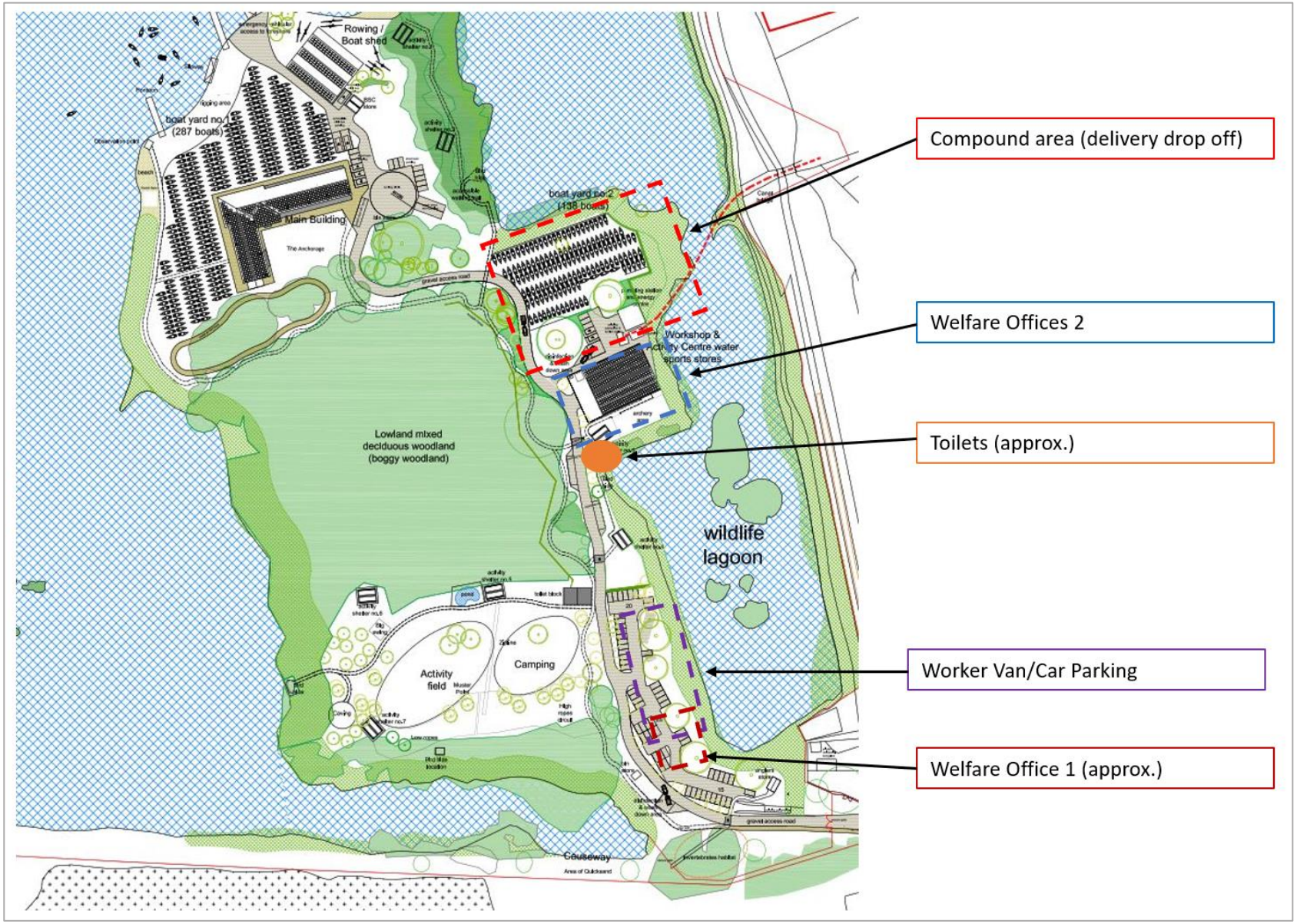
6.4.16 The main construction compound will be securely fenced and is likely to comprise:

- Main office and administration facilities;
- Welfare and local administration facilities for the peak number of staff and workforce during construction;
- First aid office would be provided for project inductions and safety workshops;
- Hard standing for staff and vehicle parking in close proximity to compound offices;
- Compound security and visitors reception area;
- Visitors designated car parking at the compound entrance;
- Material delivery area in close proximity to material storage to reduce distance of mechanical and manual handling movements;
- Generator / electrical substation;
- Secure enclosed fuel storage area with spill kits; and
- Hardstanding and roadways will be laid within the compound.

6.4.17 The indicative location of the construction compound, welfare offices, the toilets and the construction worker car parking are presented in Figure 6.1.

6.4.18 The nature of the work is such that a number of specialist subcontractors will be required to undertake the various elements of work. The number of workers will vary depending on the stage of the project.

Figure 6.1: Indicative Construction Compound Location



Enabling Works – Site Access Road

6.4.19 Current pedestrian and vehicular access to the peninsula and lake is from a private access road via Moorhall Road in the south of the Site. There are currently no footways or street lighting present on the access road. Additional users also have access rights from the site access road. These include GRS Bagging, a construction material wholesaler, Harleyford Aggregates, a sand and gravel supplier, residents of formal and semi-formal residential dwellings. This road will be used to construction purposes however it is in poor condition and therefore requires improvement during the enabling stage of the construction works. An image of the existing site access road is provided below.

6.4.20 Upgrade works on the access road will take place from the bell mouth junction with Moorhall Road to the access to Broadwater Lake which will include new surfacing, street lighting and a dedicated pedestrian footway and access. Works would be undertaken to an adoptable standard.

6.4.21 To mitigate disruptions for GRS Bagging and Harleyford Aggregates deliveries, part of the upgrade works to the site access road will be undertaken in two halves which allows access to maintained. Alternatively, these works may occur outside of operational hours for GRS Bagging and Harleyford Aggregates. If works are required outside of the proposed construction hours, the principal contractor will seek permission from the LBH to undertake these works.

6.4.22 Contractors would also take due care to minimise disruption to existing residents and ensure that emergency access and access for HS2 is available at all times.

6.4.23 The construction method of the site access road upgrade will be confirmed once a principal contactor has been appointed. During this phase construction materials will be delivered by rigid lorries, paving and roller HGVs will be required. No abnormal loads are required.

Enabling Works – In-Lake Works

Dredging

6.4.24 At this early stage, a specialist dredging contractor has not been appointed to undertake the works, however initial discussions have taken place which have informed the methodology set out below.

6.4.25 The target dredging zones (see Figure 5.2 in Chapter 5: Description of Development) are predominantly made up of compacted gravel with some areas being overlain by silt and some sand present within the gravel voids. Sediment sampling in the lake confirms the ready fluidisation of the finer particles when the cores were lifted, demonstrating that typically, dredging will lift gravels, leaving finer sediments behind.

6.4.26 It is anticipated that a long-reach excavator can be manoeuvred into position on a suitably sized pontoon. The long-reach excavator will then proceed to dredge the gravels or island soils, lifting and removing from the water or islands, and place in a second receiving barge.

Island Removal/ Creation

6.4.27 The barge would transit down the lake along an agreed and buoyed route to the island receptor site where the gravel can be unloaded by a second excavator which will likely also be placed on a pontoon and placed into position.

6.4.28 Turbidity curtains or bubble curtains would be used around each area of lake dredging/in-lake works to prevent dispersion of turbid water into adjacent parts of the lake. Turbidity within and outside of these features would be continuously monitored. They would only be removed when turbidity returns to levels (e.g., baseline turbidity) agreed with the EA and Natural England.

6.4.29 As the gravel builds up, it will find its natural submerged 'angle of repose'. This can be enhanced and made more efficient through the use of a form of post 'fence' to create an island boundary and shape that the materials can be placed into. Accurate GPS controls and geolocated plans on the excavator will ensure the sediment is placed in the correct location. This approach creates the margins of the islands by placing sediment adjacent to / on top of the island perimeter and / or pulling local lake bed sediment up to meet the island perimeter. This minimises the wastage of gravel as it will contain a core volume. The islands will also likely be covered with local finer lake sediment and dredged island soil to promote the growth of luxuriant aquatic macrophytes and suitable trees and shrubs.

Peninsula Land Reclamation

6.4.30 It is anticipated that in order to create suitable conditions to commence the land reclamation, a combination of dynamic compaction and vibro compaction may be required.

6.4.31 Dynamic compaction is where the fill material is densified via the repeated dropping of a heavy steel and concrete weight, weighing approximately 10 tonnes, and dropping from a height of up to 10 metres. The tamping of the surface of the reclaimed land is carried out in a grid formation, and the area may need up to 3 rounds of tamping. The imprints that are formed at the weight drop positions shall be infilled with the dredged material and re-tamped.

6.4.32 Vibro-compaction would likely entail a vibratory cylinder (vibroflot) hung from a crane which penetrates to the desired depth into the reclaimed land, usually assisted by water jetting. The vibration of the vibroflot causes the loose, granular soil to form a denser material. A 3m grid is usual for the compaction process.

6.4.33 Once the compaction stages have been completed, the peninsula land will be extended with dredged material using the methods described above.

6.4.34 A specialist ground improvement contractor will be engaged and details of the appropriate method of compaction will be included within the Construction Method Statement for LBH approval prior to the works commencing.

Construction – Main Works and Peninsula

6.4.35 Following completion of the in-lake works, the peninsula will be sufficiently reclaimed to allow the main works on the peninsula to proceed. The main works and peninsula phase

will comprise construction of HWSFAC buildings and facilities, landscaping, vehicle and boat parking, internal access road fencing and gates.

Construction of Buildings

6.4.36 Building structures would only be constructed on the peninsula. For construction of the new buildings (including the Main Building, Boat Shed and Workshop), traditional masonry construction will be undertaken. Materials will include brick blocks with truss timber roofs, concrete and steel frames.

Piling and Substructure

6.4.37 Details of piling will be provided and subsequent stages of detailed design. Piling will be required for construction of the main building, workshop and boat shed. A Piling Risk Assessment will also be undertaken due to the sensitivities of the Site and groundwater. It is expected that the new buildings will require a pile diameter of 450mm, installed to an approximate depth of 10m below ground.

6.4.38 Once the piles have been formed, pile caps will be installed on top which will be made of concrete and likely reinforced. There are two options that can be employed for the sub-structure design which are still to be confirmed, these are:

- piles under pile caps, ground beams spanning between the pile caps and a suspended slab; and
- piles under pile caps, and piles at 3m centres (TBC) under a suspended slab.

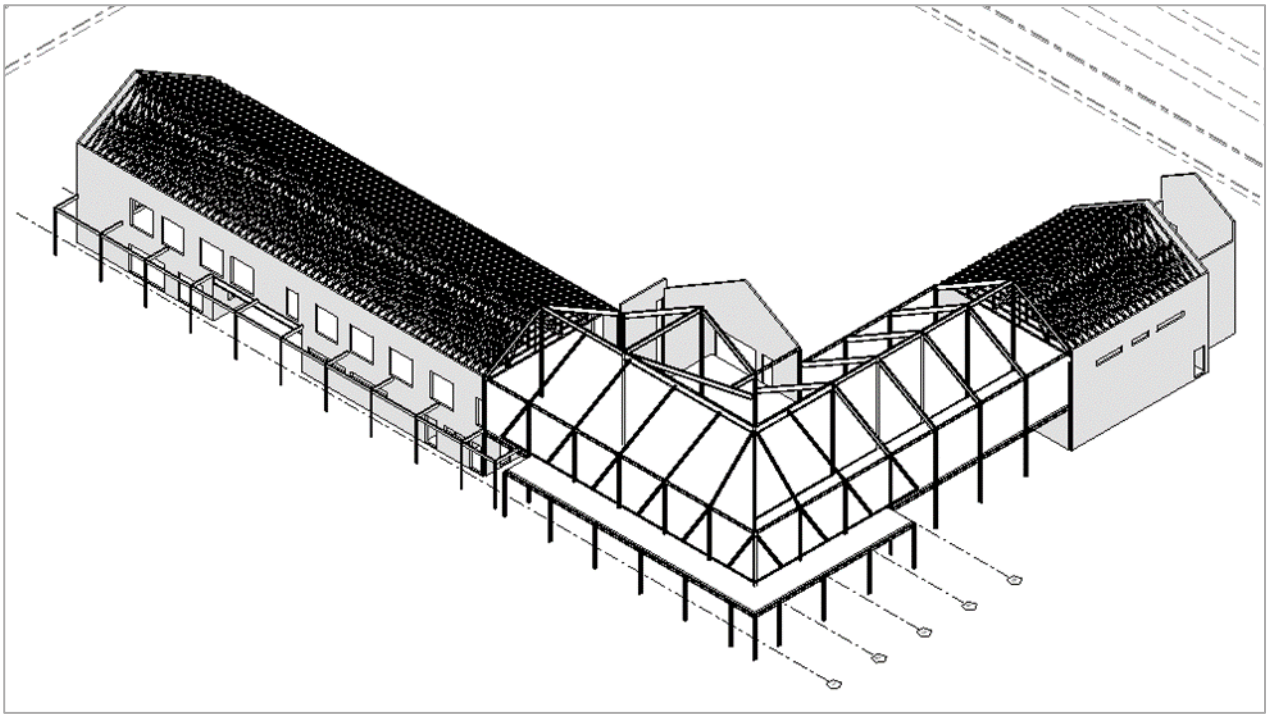
6.4.39 During piling operations, the use of reliable monitoring and data recording systems is fundamental and shall be in place. Following piling operations, the contractor shall conduct regular inspections and load tests on the piles to verify their integrity and load-bearing capacity which will then be confirmed by the structural engineer.

Superstructure and Roof Construction

6.4.40 All the buildings on-site will have a ground floor concrete slab. The first-floor slab of the main building will be a reinforced concrete hollow core slab which will be further clarified upon progression of the detailed design.

6.4.41 The main building will be a typical traditional construction of brick and block cavity external walls, internal solid blockwork load bearing walls and timber framed pitched roofs finished with clay tiles. The roof framing to the large floor spans to the multi-purpose room, balcony area and social room will be an exposed metal frame and will be treated accordingly to withstand the wet climate / environment of which the building will be located.

Figure 6.2: Main Building Construction Visual



6.4.42 The Boat Shed and Workshop are both of a similar construction. These will comprise a portal steel frame with single metal sheet roof decking and cladding panels supported on cladding support rails. As these are storage spaces they are not required to be insulated, although they will be detailed to reduce condensation. Insulation will be applied to the internal blockwork walls and ceilings of office and ancillary areas of these buildings instead to ensure suitable habitable working environments for those that will be working within the space for a short period of time. It is anticipated that this will comprise 2 x 100mm blockwork walls with cavity and insulation between

Boat Parking Area

6.4.43 It is envisaged that boat parking will be installed on the existing hard standing where applicable or compacted gravel will form the top surface layer. The contractor will ensure that drainage systems are installed to prevent standing water and facilitate runoff. Further details of the proposed drainage strategy are provided in Appendix 8.2: Flood Risk, Drainage and Sequential Assessment.

6.4.44 New slipways will be constructed out of concrete in accordance with the detailed design information. The slipway will be constructed from in-situ reinforced concrete. In preparation for the concrete works, excavators will be used to form the desired profile of the ramp, assumed to be to falls of 1:10. The base of the slipway will be approximately 1.5m below the lowest recorded water level and so a small temporary cofferdam will be constructed from steel sheet piling or alternative temporary sheeting. This will allow for dewatering to facilitate construction of portion of ramp below the water level. The subbase to the ramp comprising of 150mm well type 1 will be laid and compacted onto which the concrete will be poured. The concrete slab will be approx. 250mm thick and reinforced with 2 layers of steel mesh. The slab will be cast in a single pour from bottom to top with tamped and raked finish. After approximately 2-3 days when the concrete is sufficiently cured the cofferdam can be flooded and temporary sheeting removed.

6.4.45 Alternatively, to reduce scope of temporary works the length of the ramp below the water level could be constructed from precast concrete cast in sections above ground level. These will be maneuvered into place by suitable lifting plant.

Demolition of BSC Building

6.4.46 During the BSC demolition and site clearance phase, pre-demolition surveys will initially be undertaken. Once the surveys are finished and the results collated and analysed, mobilisation will begin, and site hoarding will be erected and secured to the north of Broadwater Lake. Demolition and site clearance of BSC will then take place. After demobilisation, ecological enhancement activities at the north of the Site will be carried out. During this phase, limited HGV movements are expected. Excavators, skip lorries and tippers will be required to remove material from the demolished BSC.

6.4.47 Only a small area of concrete hardstanding material to be removed from the north-eastern peninsula area. All other areas of existing hardstanding will remain in-situ to act as a low permeability cover layer over landfilled areas of the peninsula.

Construction – Canal Bridge

6.4.48 The canal bridge over the Grand Union Canal will be used as a utilities gantry to service the Site. The works will include but is not limited to, capping-off or removal of redundant utilities and installation of new supplies, diversions and connections for electrical, telecommunications, gas, potable water, foul water and surface water drainage infrastructure (including SuDS), as agreed with the statutory authorities.

6.4.49 Access by a rigid lorry and mobile crane will be required from Mayling Transport's yard that is bound by Grand Union Canal to the west.

6.4.50 As set out in the CLP, Grand Union Canal users will be notified about works occurring on the canal. Signage will be placed in prominent locations advising of the relevant dates and times.

6.4.51 The works will require the temporary closure and diversion of the London Loop PRoW although all efforts will be made to ensure this causes as little disruption as possible.

Future Ecological Enhancements

6.4.52 Ecological enhancements will occur towards the end of the construction phase.

6.4.53 To summarise, designed-in mitigation as shown on the masterplan secures a raft of enhancement measures, including:

- Enhancements and long-term management of retained woodland at the Proposed Development;
- Floating islands as well as tern rafts will be provided through the Proposed Development to increase the total area of roosting habitat at the lake. During winter these islands and trees may be used by roosting wintering birds; and
- General biodiversity enhancements within the lake such as areas of aquatic and emergent planting, and artificial reefs to support greater numbers of small fish and

overall larger fish populations may increase the overall food resource for wintering birds.

6.4.54 Further details are provided in Chapter 5: Description of Development.

6.4.55 HGV movements are expected to be minimal during this phase.

6.5 Materials and Waste

Demolition

6.5.1 Where feasible, materials generated through the demolition of BSC would be re-used to create suitable platforms for development. Re-use of such materials would be dependent on it meeting relevant geotechnical specification requirements and being inert. Reuse of material reduces deliveries to the Site and the amount of waste for disposal.

Construction

6.5.2 Waste produced during all demolition and construction activities on-site will be subject to the 'Duty of Care' under the Environmental Protection Act 1990[2]. It will be the joint responsibility between the Principal Contractor and the Applicant to ensure that waste produced on-site is disposed of in accordance with legislation. A Site Waste Management Plan (SWMP) will be prepared prior to commencement of works on site. The SWMP will specify the procedures by which waste will be managed during the demolition and construction stage. The Principal Contractor is expected to take ownership of the SWMP document. The SWMP will identify the types and quantities of waste that would be produced throughout the demolition and construction of the Proposed Development and would identify management options for each type of waste, paying attention to the waste hierarchy.

6.5.3 Table 6.2 provides high-level indicative construction waste volumes based on the proposed building area schedule. Further refinement of these figures will be undertaken through the detailed design development.

Table 6.2: Indicative Construction Waste Volumes

Waste Type	Percentage	Indicative Forecast (tonnes)	Indicative Forecast (m^3)
Bricks	5%	24.4	47.3
Tiles and Ceramics	5%	24.4	47.3
Concrete	11%	53.7	104.0
Inter Material	16%	78.1	151.3
Insulation Materials	2%	9.8	18.9
Metals	10%	48.8	94.5
Packaging Materials	10%	48.8	94.5
Plasterboard / Gypsum	10%	48.8	94.5
Binders	1%	4.9	9.5

Waste Type	Percentage	Indicative Forecast (tonnes)	Indicative Forecast (m^3)
Plastic	5%	24.4	47.3
Timber	15%	73.2	141.8
Floor Coverings	0%	0.0	0.0
Electrical and Electronic Equipment	1%	4.9	9.5
Furniture	0%	0.0	0.0
Canteen / Office/ Ad-hoc Waste	5%	24.4	47.3
Liquids	1%	4.9	9.5
Oils	0%	0.0	0.0
Bituminous Mixtures	2%	9.8	18.9
Hazardous Waste	1%	4.9	9.5
Mixed Construction and/or Demolition Waste	0%	0.0	0.0
Total	**100%**	**488**	**945**

6.5.4 There will be no import of fill materials to facilitate the island formation within Sub-Phase 3c. All material will be obtained from the dredging of the lakebed as described previously. Cut and fill volumes are as follows:

- Zone 1 – Lake dredging volume increased to balance fill requirement for land reclamation – Cut volume circa 47,500m^3;
- Zone 2 – Fill requirement for land reclamation – Fill volume circa 47,500m^3; and
- Zone 3 – Cut on existing peninsula limited to reduced level dig on north east corner – Cut volume circa 2500m^3.

6.5.5 All relevant contractors will be required (this will be controlled via a planning condition on the planning permission) to operate in accordance with the detailed CEMP and will be required to investigate opportunities to minimise and reduce waste generation in line with the Government aim of *"Work towards eliminating all avoidable waste by 2050"* by:

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
- Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
- Use of standard size components in design detailing to eliminate risk at source where possible to do so;
- Attention to material quantity requirements to avoid over-ordering and generation of waste materials;
- Re-use of materials wherever feasible, e.g., re-use of excavated soil for landscaping;

- Segregation of waste at source where practical;
- Re-use and recycling of materials off-site, where feasible, and where re-use on-site is not practical (e.g., through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing);
- Skips will be colour coded and signposted to reduce risk of cross contamination and covered to prevent dust and debris blowing around the Site, these will be cleared on a regular basis; and
- No burning of wastes or unwanted materials on-site.

6.5.6 The relevant contractors will be required to carry out works in a way that, as far as is reasonably practicable, minimises the amount of waste to be disposed of by landfill. Any waste arisings from the Site will be transported and disposed of in accordance with relevant legislation, including the following:

- The Environmental Permitting (England and Wales) Regulations 2016[3] (as amended)[4];
- The Waste (England and Wales) (Amendment) Regulations 2011[5] (as amended)[6];
- The Waste Management (England and Wales) (Amendment) Regulations 2006[7]; and
- Clean Neighbourhoods and Environment Act 2005[8].

6.5.7 The project will seek to maximise the reuse of suitable soils on-site, where possible, to minimise waste disposal.

6.5.8 Hazardous waste will be kept separately from other wastes and in appropriate containers and Duty of Care will be ensured for the transfer and removal of all site wastes. Further details are provided in Appendix 6.1: Outline Construction Environmental Management Plan and the Site Waste Management Plan which accompanies the planning application.

6.6 Construction Plant and Equipment

6.6.1 The following construction vehicles and plant will be required the main phase of construction:

- A 25-tonne mobile crane will be required to lift roof trusses for the buildings;
- Deliveries of plant and materials such as bricks and steel beams by large rigid and articulated lorries;
- Concrete mixers and pumps will be required for laying concrete slabs where required;
- Excavators will be required. A larger excavator will be required for removal of the retaining wall to the northwest corner of the peninsula;
- Large tippers will be required for the movements of aggregate and other material;
- Skip lorries will be required to deliver and collect skips to remove non-reusable waste from the Site;
- Telescopic forklifts will be required to move materials around the Site, once delivered; and
- Concrete crushers will be used on-site to crush and reuse the existing concrete on-site.

6.6.2 An indicative list of large plant and equipment that are likely to be used at various phases of construction are shown in Table 6.3.

Table 6.3: Indicative Plant and Equipment

Plant and Equipment	Stage of Works				
	Enabling Works – Site Access Road	Enabling Works – In-Lake Works	Construction - Main Works and Peninsula	Construction - Canal Bridge	Future Ecological Enhancements
360^0 Excavator	✔	✔	✔	✔	✗
Long Reach Excavator	✗	✔	✗	✗	✗
Tower / Mobile Crane	✗	✗	✗	✔	✔
Breaker	✗	✔	✗	✔	✗
Compressor & Air Tools	✗	✔	✗	✔	✔
Drills / Cutters	✔	✔	✗	✔	✔
Compacter / Roller	✗	✗	✔	✔	✗
Piling Rigs	✗	✗	✗	✔	✗
Concrete Pumps	✗	✔	✗	✔	✗
Generators	✔	✔	✔	✔	✔
Concrete Vibration Equipment	✗	✗	✗	✔	✗
Scaffolding	✗	✗	✗	✔	✔
Fork Lift Truck	✗	✔	✗	✔	✗
Mechanical Road Sweeper	✗	✔	✗	✔	✗
Floodlights	✔	✔	✔	✔	✔
Hydraulic benders and cutters	✗	✗	✗	✔	✔
Lorries, HGVS and Vans	✔	✔	✔	✔	✔
Ready mix concrete trucks	✔	✔	✗	✔	✗
Floating Barge	✗	✔	✔	✔	✗
Concrete Weight	✗	✗	✗	✔	✗
Vibroflot	✗	✗	✗	✔	✗

6.7 Timing and Hours of Work

6.7.1 Careful consideration of the spatial phasing and timing has been a significant consideration of the programme development due to the ecological sensitivity factors with the presence of sensitive ecological receptors present within the Site and the surrounds. A key example is the in-lake land reclamation and dredging which are required to be undertaken outside of

sensitive timings. is anticipated that the core working hours for construction stage will be as follows:

- 07:00 – 18:00 weekdays;
- 07:00 – 13:00 Saturday; and
- No working on Sundays or Bank Holidays.

6.7.2 In line with LBH Guidance[9], construction work which gives rise to noise that is audible at the construction area boundary will be restricted to:

- 08:00 – 18:00 weekdays
- 08:00 – 13:00 Saturday

6.7.3 HGV movements will be restricted as far as reasonably possible to avoid peak traffic flow periods (i.e., from 08:00 - 09:00 and 17:00-18:00).

6.7.4 Approval from LBH will be required for any works that need to be undertaken outside of permitted hours and it is expected that LBH may vary these hours where the works are in close proximity to sensitive businesses or residential properties.

6.8 Construction Traffic Management

6.8.1 A detailed CLP has been prepared to accompany the planning application and is also included as an Annex to Appendix 6.1: Outline CEMP. The CLP includes measures which are design to:

- Optimise the efficient delivery and collection of goods and materials to the Site;
- Lower traffic emissions by timing construction vehicle movements in off-peak hours where possible and avoiding congested routes;
- Enhance safety – improved vehicle and road user safety, especially along the Site access road;
- Reduce congestion – reduced trips overall to the Site; and
- Minimise disturbance to ecological receptors within the Site caused by construction.

6.8.2 To support these objectives, the Applicant has committed to the following sub-objectives:

- Promote smarter operations that reduce the amount of vehicle trips required to the Site (i.e., bringing multiple building materials from one supplier).
- The use of Fleet Operative Recognition Scheme (FORS)[2] accredited vehicles.
- Managing the on-going development and delivery of the CLP with construction contractors.
- Deliveries to be scheduled out of network peak hours where possible.
- Avoid all Heavy Goods Vehicle (HGV) movements through Harefield Village.

[2] The Fleet Operator Recognition Scheme (FORS) is a voluntary accreditation scheme for fleet operators which aims to raise the level of quality within fleet operations, and to demonstrate which operators are achieving exemplary levels of best practice in safety, efficiency, and environmental protection.

6.8.3 Further information on the principles of construction traffic management included in the CLP is provided below.

Construction Vehicle Routing and Deliveries

6.8.4 Figure 6.3 shows the local construction vehicle routing to the Site. HGVs will be required to approach the Site from Denham via the M25, M40, A40 or the A412. Once on the A412, HGVs will be required to turn then east onto Moorfield Road, continuing onto Moorhall Road until the site access road. Once at the Site access junction, HGVs will turn left onto the unnamed access road proceeding to the Site entrance. HGVs will not be permitted to travel through Harefield village under any circumstances.

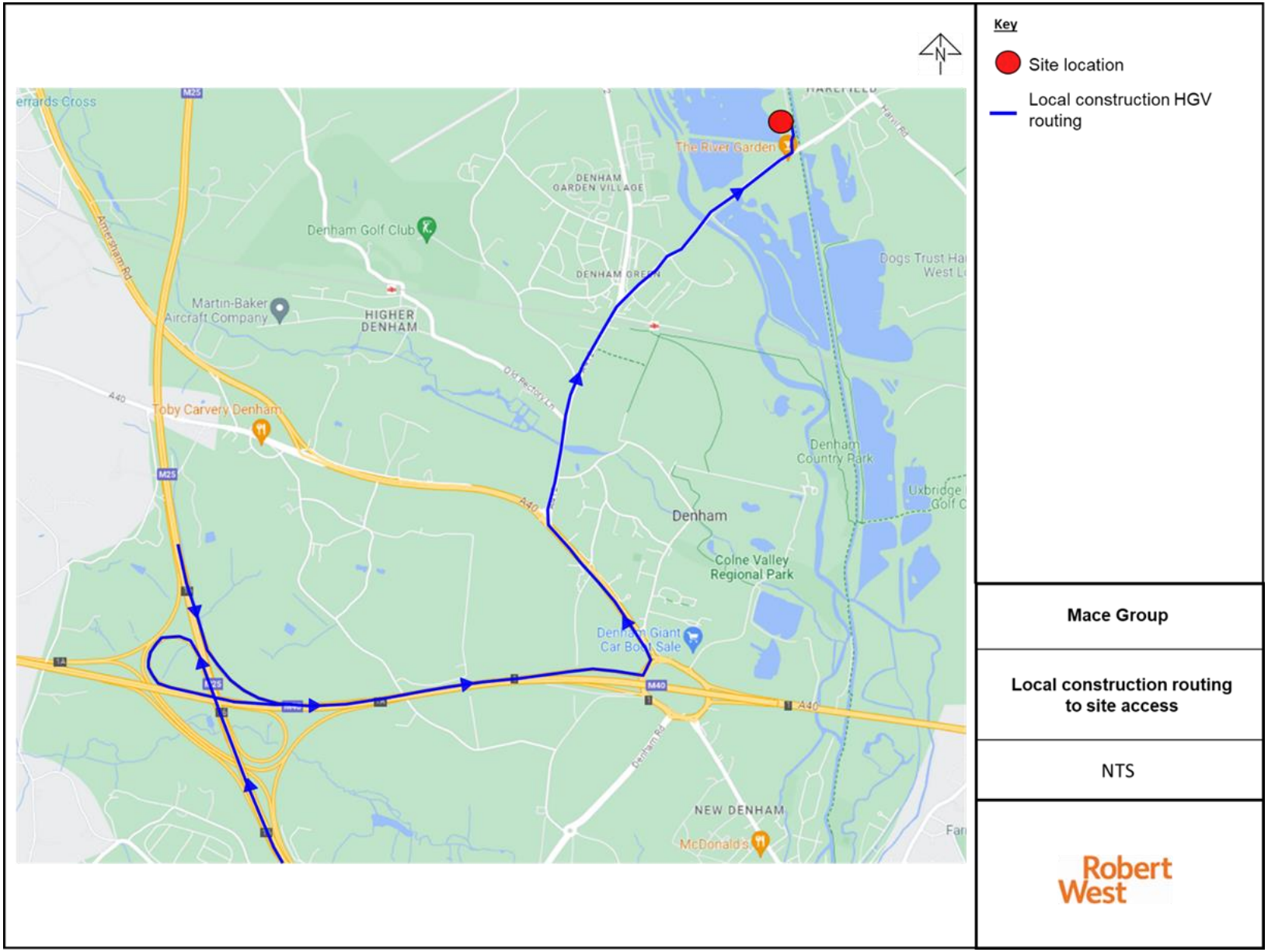
6.8.5 During the enabling works phase, a small number of construction vehicles will be required to travel to Mayling Transport Yard, 50m to the east of the Site via Broadwater Lane. Construction vehicles require to travel to Mayling Transport Yard will be notified ahead of departure and will be checked in at this location.

6.8.6 Light Goods Vehicles (LGVs) and cars will utilise the local highway network and are not restricted to permitted routes.

6.8.7 A copy of the final route plan will be given to all suppliers when orders are placed to ensure drivers are fully briefed on the required route to take. The suppliers will be made aware that these routes are required to be followed at all times unless agreed or alternate diversions are in place.

6.8.8 There will be no public access to the Site during the construction period from the Site access road off Moorhall Road, with the exception of permitted anglers and future users of HWSFAC towards the end of construction period during temporary opening. Access for all users will be strictly controlled and hoarding will be erected at the Site access to prevent any unauthorised access.

Figure 6.3: Local Construction HGV Routing



Construction Vehicle Management

On-Site

6.8.9 Secure cycle parking for contractors and visitors will also be provided on-site. On-site parking will be provided to eliminate contractor parking on the local highway network and the site access road. On-site parking provided includes secure cycle parking for contractors and visitors. Staff will be encouraged to use sustainable transport including the frequent bus services provided within the vicinity of the Site.

6.8.10 The Principal Contractor and sub-contractors will ensure a commitment to careful management of Site deliveries and collections by scheduling them in a manner that consciously avoids, where possible, the most congested times of the day.

6.8.11 A delivery management system will be used to control the volume of deliveries to the Site. This system will work by defining the number of resources the site has and thus can service in 30 minutes intervals. It then limits the number of delivery bookings per half-hour to this defined capacity.

6.8.12 Construction vehicles will have a dedicated time of arrival slot that will be required to be pre-booked in with the site logistics manager. HGV deliveries will be scheduled outside of network peak hours (08:00-09:00 and 17:00-18:00). This is to avoid construction vehicles adding capacity to the local highway network, adding to any congestion during these hours.

6.8.13 A gateman/ banksman will be present at the Site access to check all construction vehicles and undergo any necessary vehicle checks. The gateman will prevent unauthorised access to the Site.

6.8.14 The gateman/ banksman will also prevent any waiting or queuing of HGVs on the Site access road waiting to enter the Site. In the event that this occurs vehicles will either enter the Site, be re-routed or asked to leave and be rescheduled.

6.8.15 All construction vehicles will load / unload within the Site boundary and perform turning manoeuvres within the Site, preventing these movements on the local highway network or the Site access road.

Off-Site

6.8.16 The labour force will be encouraged to use public transport and other sustainable modes. To prevent contractor and visitor parking within external car parks, the Principal Contractor will make clear as part of the Site rules that car parking in the River Garden public house or other external car parks within the vicinity of the Site will not be permitted.

6.8.17 Local traffic management measures for Site access will be agreed with LBH prior to construction commencing in conjunction with surrounding development sites.

Off-Site – HS2 Considerations

6.8.18 High Speed Two (HS2) construction works are being undertaken within the Colne Valley Viaduct area. Construction vehicles access for the HS2 project is currently being undertaken from Moorhall Road, approximately 300m to the west of the Site access road entrance to the Site.

6.8.19 There is no anticipated overlap with the enabling works phase of construction and the end of HS2 works currently on-going. Construction vehicle access from Moorhall Road by HS2 is expected to finish at the end of December 2023. Enabling works are not anticipated to begin until June 2024.

Other Measures

6.8.20 Section 5.0 of the CLP provides further detail on other measures to reduce construction traffic and associated effects which would be explored by the Applicant, including use of holding areas, the canal, collaboration with other sites in the area, staff travel plan.

Construction Vehicle Movements

6.8.21 The following construction vehicles are expected to travel to / from the Site:

- Articulated lorries;
- Rigid lorries;
- 25 tonne mobile crane;
- Concrete mixers;
- Excavators; and
- Large tippers.

6.8.22 The largest vehicle expected to travel to/from the Site is a 16.5m articulated lorry. A swept path analysis has been undertaken and is presented within the CLP.

6.8.23 Section 6.0 of the CLP provides predicted levels of construction traffic. As a contractor is not yet appointed and construction vehicle volumes are subject to change, although are presented as reasonable worst-case assumptions.

6.8.24 The estimated numbers of vehicle journeys, including Heavy Goods Vehicle (HGV) movements, have been projected for the busiest periods during the enabling works and construction programme to allow for an assessment of the ‘worst case’ scenario; thereby making the assessment as robust as possible. This has been calculated based on volumes of construction waste material. The final estimates of vehicles movements will be checked and confirmed by the contractor and will be included in a revised CLP which would be submitted to LBH for approval.

6.8.25 A total of 771 HGVs are estimated to be required throughout the entire construction phase. The peak construction period will be during Q1 2025 where up to 72 HGVs are expected to travel to the Site each month with an average of three daily HGV trips.

6.8.26 In addition to HGV trips, LGV (light vans) and car trips to the Site are expected daily throughout construction by contractors and visitors. During peak construction up to 30 van and car trips are expected daily. Outside of peak construction there is more likely to be between 15-20 van and car trips daily.

6.8.27 HGV routes have been identified to manage the arrival and departure of construction vehicles from the wider strategic road network and local highway network. This is to minimise the impact on existing road users, highway safety and capacity.

As stated above, during the enabling works, a small number of construction vehicles will be required to travel to Mayling Transport Yard 50m to the east of the Site via Broadwater Lane. Construction vehicles require to travel to Mayling Transport Yard will be notified ahead of departure and will be checked in at this location.

6.9 Construction Environmental Management

6.9.1 The Applicant has committed to implementing a CEMP during enabling, demolition and construction activities. An Outline CEMP is submitted as part of the ES Appendix 6.1. The Outline CEMP sets out the strategy, standards, control measures and monitoring procedures that will be implemented to manage and mitigate any adverse environmental effects of the construction process, including mitigation measures defined by the ES.

6.9.2 The roles and responsibilities of the Applicant, Principal Designer and Principal Contractor, as required by the CDM Regulations, are not outlined within the Outline CEMP and will be confirmed in writing upon the appointment of the Principal Designer and Principal Contractor by the Applicant.

Considerate Constructors' Scheme

6.9.3 The Site will be registered with the 'Considerate Constructors Scheme' (CCS)[10]. The CCS ensures that contractors carry out their operations in a safe and considerate manner with due regard to passing pedestrians, road users and surrounding properties.

Stakeholder and Neighbour Relations

6.9.4 There are residential properties and businesses along Moorhall Road which is to be used during construction. Existing users of the lake and canal will also be sensitive to effects during the construction works. A key aspect of the successful management of the project will be the maintenance of good relations with Site neighbours and the general public. The Principal Contractor will commit to appointing a community liaison manager, who will be the first line of response to resolve issues of concern or complaints.

6.9.5 Site boards outlining information on the scheme and forthcoming works will be erected at the entrance to the Site. Site contact numbers will be displayed as appropriate, along with the complaints procedure.

6.9.6 The Principal Contractor will share information about the construction programme with the immediate neighbours via written correspondence. The correct Personal Protective Equipment (PPE) will be used at all times and considerate methods of construction such as auger piling will be used to minimise noise and vibration impacts.

6.9.7 Access to the residential dwellings will be maintained throughout construction. Residents and other interested parties (including BSC, HS2 and Canal and River Trust) will be informed via written correspondence of the dates, times and details of any works occurring outside of access to their property. Details of a site contact will be made available to residents to further discuss any of the details associated with construction works.

6.9.8 Both businesses that share the access road (construction material wholesaler and a garden building supplier), generate HGV trips within working hours between 07:00 and 17:00. The

Principal Contractor will be required to communicate with GRS Bagging and Harleyford Aggregates to co-operate and integrate deliveries as far as practically possible.

Lighting

6.9.9 The Site must be provided with suitable and sufficient lighting, which must be, so far as is reasonably practicable, by natural light. This relates to both the construction site as well as the approach and traffic route to the working area.

6.9.10 Site lighting during the construction phase will comply with the Institution of Lighting Engineers' guidance notes for the reduction of light pollution and the provisions of BS 5489, Code of Practice for the Design of Road Lighting[11], where applicable.

6.9.11 In determining any temporary construction lighting arrangements for the Site, due consideration will be given by the Principal Contractor to residents with lighting directed away from adjacent residential properties.

6.9.12 Construction lighting will also be designed to avoid disturbance to foraging and commuting bats in accordance with good practice. Works will be undertaken during daylight hours only and there will be no lighting at night during the construction phase.

6.9.13 No security lighting will be installed as the Site may be secured through its existing gates and through presence of security personnel. Lighting of site compounds, although temporary, will be designed in accordance with best practice guidance. It will be bespoke, low level, shielded and directional with LED and warm colour temperatures. Site compounds will be enclosed by visual screening.

6.9.14 Details of construction lighting would be agreed and controlled through the CEMP.

Arboriculture

6.9.15 Specific mitigation measures for ecology and arboriculture during the construction stage are presented in Appendix 10.6: Stage 1 and 2 Arboricultural Impact Assessment Report.

6.9.16 A detailed arboricultural method statement (AMS) will be compiled, detailing the exact location and nature of protective fencing, tree pruning, signage, timings and methods of works and other protection measures. All site operatives will be made aware of the nature of the protection detailed in the AMS and it will remain in place throughout construction.

Ecology

6.9.17 Specific mitigation measures for during the construction stage are presented Chapter 7: Biodiversity and the Outline CEMP.

6.9.18 Timing of works is critical and has been considered alongside the Proposed Development of the masterplan and the construction methodologies required. As the presence of ecological receptors depends on the time of year, works undertaken at different times can have extremely different impacts and effects. Wintering birds are present from mid-October to mid-March; breeding birds are present March to August. This only leaves the month of September where works may be undertaken within the lake without impacting either receptor.

6.9.19 To avoid noise, vibration and visual disturbance to the lagoon (and habitats beyond to the east) during construction, a temporary barrier providing a visual screen will be erected around the lagoon once sufficient buddleia and scrub have been removed (during September 2023 – February 2024).

6.9.20 To avoid noise and visual disturbance to breeding woodland birds, prior to the commencement of the bird breeding season (March 2024), a visual and acoustic screen will be installed around the woodland, slightly inset behind the tree line. This has been designed into the Proposed Development, to prevent any significant disturbance of bird species using the woodland for breeding, initially during construction and later (from April 2025) during operation. Details of the design, installation methodology and timing of implementation of the operational phase visual and acoustic barrier around the woodland should be set out within a Landscaping Plan for the Site which will be secured by condition.

6.9.21 To avoid impacts from noise and vibration from construction works occurring at the peninsula to surrounding habitats and receptors, works compounds will be located away from the lake shoreline, lagoon and woodland. Acoustic barriers will be placed around noise and vibration generating plant.

Dust and Other Emissions

6.9.22 A construction dust assessment has been undertaken for the Proposed Development and is included within an Air Quality Assessment which accompanies the planning application. Dust effects are not considered to be significant and as such are scoped out of the ES.

6.9.23 The construction activities will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Appropriate measures to mitigate dust emissions based on best practice guidance and the construction dust assessment (part of the Air Quality Assessment) will be included within a Dust Management Plan which will form part of the detailed CEMP. These include measures related to Site Management, Preparing and Maintaining the Site, Operating Vehicle/Machinery and Sustainable Travel, Demolition, Waste Management, Operations, Earthworks and Construction.

6.9.24 Since it is difficult to suppress dust once it is airborne, wherever risks would be minimised at source such as through the covering of stockpiles, working methods, wheel washing and good plant and vehicle maintenance.

6.9.25 All vehicles leaving the Site will be checked prior to alighting onto Moorhall Road ensuring no debris is taken off-site. Wheel washing facilities will be present at the Site access to be used before construction vehicles leave the Site.

6.9.26 In line with the GLA's Control of Dust and Emissions from Construction and Demolition during Construction and Demolition Supplementary Planning Guidance (SPG) (GLA, 2014), Non-road Mobile Machinery (NRMM) are expected to comply with emissions standards.

Noise and Vibration

6.9.27 Potential sources of noise and vibration during the construction phase will include (but not restricted to) plant and usage of heavy machinery, piling activities, crushing activities and vehicle movements. A construction noise and vibration assessment has been undertaken

and is presented in Noise Assessment report that accompanies the planning application (prepared by Noise Consultants). Activities that produce the greatest noise levels include road construction, dredging of the lake, and demolition of the BSC building. A worst-case assessment has been undertaken with activities such as road construction assessed at locations nearest to the on-site residential NSRs. Mitigation measures during the construction stage are specified within the Noise Assessment and the CEMP.

6.9.28 The Principal Contractor will implement the necessary management and operational controls on-site to minimise adverse noise and vibration impacts on nearby sensitive receptors from construction site activities.

6.9.29 Good practice site measures will seek to minimise potentially adverse noise and vibration effects that result from these activities. Should a complaint be received regarding noise and/or vibration, the Principal Contractor will consider installing monitoring equipment to measure the level of vibration being caused and, if it is deemed necessary, additional mitigation measures will be implemented to further reduce these impacts.

Ground Conditions and Soil Resource

6.9.30 The Proposed Site Development Plan indicates only a small area of concrete hardstanding material to be removed from the north-eastern peninsula area. All other areas of existing hardstanding will remain in-situ to act as a low permeability cover layer over landfilled areas of the peninsula.

6.9.31 Pre-demolition asbestos survey of remnant site buildings and structures – this will be undertaken on any structures that are to be removed as part of the proposed Development to identify Asbestos Containing Materials (ACM) requiring regulated removal off-site by specialist licensed contractors.

6.9.32 Environmental Permits will be required to cover the works associated with the Development and are likely to include; Waste Framework Directive (EPR Schedule 9 – Waste operations and materials facilities), the Landfill Directive (EPR Schedule 10 – Landfill), Mining Waste Directive (EPR Schedule 20 – Mining waste operations) and Groundwater activities (EPR Schedule 22 – Groundwater activities).

6.9.33 The Outline CEMP (Appendix 6.1) includes the following measures which would be implemented to mitigate the potential risks posed to human health, groundwater, surface water, built environment and ecology:

- General good construction working practices would be implemented such as dust suppression, including potentially contaminated dusts, (damping down), perimeter fencing around excavations, covering stockpiled materials;
- Appropriate stockpile segregation, locations and containment measures would be implemented to minimise the exposure of surface water and groundwater from potentially impacted runoff;
- A discovery strategy for managing and dealing with unexpected / unforeseen contamination that may be encountered during construction phase works. This may require additional site investigation, sampling risk assessment and remediation to ensure the protection of the identified receptors;

- All construction workers would be required to wear PPE such as gloves, goggles and face mask (where appropriate) to prevent dermal contact, inhalation or ingestion. Appropriate site hygiene facilities will be put in place and the presence of contaminants, and the associated risks will be explained to ground workers before they begin work;
- Fuel storage on-site would be carried out under best practice i.e., integrally bunded containers. Plant refuelling would be carried out using best practice techniques and any spills to be controlled with spill kit. Fuel storage should, where possible, be located sufficiently away from any surface water features, ditches and drains which may provide a preferential pathway for migration of leaks / spills.
- Management of water that collects on Site or within excavations would be implemented;
- Appropriate management plan for polluting substances that are being brought on Site and used as part of the construction process would be implemented. This is to include any site won materials (Broadwater Lake sediment) that are proposed to be re-used in land reclamation.
- Appropriate management plan for sediments in surface water runoff generated in construction area and laydowns would be implemented;
- Appropriate management plan of accidental leakage and / or spillage incidents of oils / hazardous substances would be implemented; and
- Incorporation of hydrocarbon interceptors into the Site drainage system at high-risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge would be implemented.

Water Environment and Flood Risk

6.9.34 Details of water environment mitigation measures are specified below:

Surface Water / Groundwater

- Adherence to the measures included in the Outline CEMP and all guidance from statutory consultees, appropriate training for all workforce including specialised toolbox talks where necessary, ongoing monitoring and management from suitably experienced Environmental Clerk of Works;
- Use of self-bunded refuelling facilities (or sufficient secondary containment with impermeable base and sides), provision of spill kits, well maintained/certificated plant and equipment, use of biodiesel only;
- Self-bunded facility for the storage of and chemicals/potentially contaminative materials being used during construction, including paints, lubricants, solvents etc. No on-site mixing of concrete, no vehicle washing on-site (apart from self-contained wheel washes if required). No discharge of construction runoff into the lake or groundwater (e.g., via soakaways);
- Cut-off ditches and/or geotextile silt-fences will be installed around excavations, exposed ground and stockpiles to prevent the uncontrolled release of sediments from the Site;
- Advanced provision of suitable operational SuDS measures that will also serve to treat suitable runoff during the construction period (that will include an agreed form of hydrocarbon interception, sediment detention and therefore phosphate capture, and

wetland vegetation suitable for managing nitrogen nutrients (e.g. through the very shallow scraping of clean surface material (without disturbing any underlying potential/known waste), lining with impermeable clay layer, clean cover layer and pre-planted native wetland plant coir blankets (vegetation from a local provenance source and agreed with Natural England) to create shallow wetland features (that will be maintained);

- Sediment traps on all surface water drains in the surrounding region;
- Silty water abstracted during excavations will be discharged to settlement tanks or siltbusters as appropriate. Only clean run-off will be permitted to discharge to ground or to the lake via the pre-installed SuDS features. A temporary discharge consent will be agreed with EA prior to the commencement of works, if necessary;
- Provision of suitable facility to contain/remove and potential contaminated liquids, storage of materials and equipment at least 10m from the lake margin and 50m from any boreholes and in Flood Zone 1 and away from highlighted groundwater flood risk areas, protect any stockpiles so that materials are not blown or washed away, no use of herbicides or pesticides;
- The CEMP will set out specific measures in relation to spillage prevention and response. This will be disseminated to relevant site employees and associated training and equipment provided. On-site provisions will be made to contain a serious spill or leak through the use of spill kits, booms, bunding and absorbent material, alongside appropriate monitoring;
- Contaminated soil will be identified by ground investigation prior to construction and either treated on-site and reused or removed and disposed of off-site by a licensed waste disposal operator at a correctly licensed waste depot. Contaminated water will be removed from the Site by tanker and disposed of at a suitably licensed location;
- Implementation in accordance with all legal and permitting requirements including Environmental Permit, Flood Risk Activity Permit, and SSSI Assent;
- No excavation of any areas associated with former regulated or potential unregulated waste activities. No removal of any concrete cover over these locations. Provision of a suitably designed/specified impermeable barrier over these areas (e.g., clay) and appropriate overlying clean cover to prevent new pathways to terrestrial areas including connected groundwater;
- Advanced construction and use of SuDS features to support the management of construction surface water runoff and discharge of this to Broadwater Lake only when at an acceptable water quality standard;
- Adoption of suitable established working method for dredging/re-use of sediment in SSSIs (e.g., use of long-reach excavators on pontoons and use of barges to extract/move and deposit dredged sediment from donor to pre-established receptor sites) will minimise the amount of lake-bed disturbance, water quality deterioration and duration of works (see the CEMP for more details on methods);
- GPS and CAD controlled dredging and land forming activities. This will prevent over-deepening/unnecessary excavation and therefore prevent any new pathways between lakebed dredging and groundwater from forming (also as this is believed to be already in hydrological continuity);
- Use of turbidity curtains or bubble curtains around each area of lake dredging/in-lake works to prevent dispersion of turbid water into adjacent parts of the lake. Turbidity

within and outside of these features would be continuously monitored. They would only be removed when turbidity returns to levels (e.g., baseline turbidity) agreed with the EA and Natural England; and

- Monitoring and reporting of the success of these measures and interactive feedback to management regime. Implementation in accordance with all legal and permitting requirements.

Flood Risk

- The contractors will consult with the LLFA and EA and sign up to the EA's Flood line warning service for works within areas at risk of flooding.
- A suitable flood safe egress route will be agreed in advance and flood evacuation plan will be implemented in good time.
- Relocation of vehicle fuel and other materials that may cause water contamination from lower lying parts of the Site or off-Site, in the event of an appropriate flood warning;
- No compounds/excavated/dredged material or vehicles or materials will be stored in Flood Zones 2 or 3.
- No works will occur within 8m of the River Colne unless authorised under a Flood Risk Activity Permit. This is limited to the demolition of the existing Sailing Club House and habitat enhancements in this northern area of the lake shore; and
- No disturbance/modification to any bank levels / fluvial defences associated with the River Colne.

Landscape and Visual

6.9.35 Temporary landscape and visual impacts from construction activities within the Site will be managed as necessary through the implementation of mitigation measures.

6.9.36 From a visual perspective, any external scaffolding, protective sheets and temporary lights (if required and permissible ecologically) around buildings under construction would be designed with context in mind. Visually, temporary hoarding on the north facing elevations of the main building and around working areas of the Site would be a recessive green or camouflage so as not to draw attention from visual receptors on raised ground to the northeast of the Site.

6.9.37 Temporary lighting would be designed to avoid light spill and visual intrusion for adjacent residential properties and recreational users, with input from ecologist.

6.9.38 Management and maintenance of new planting during the construction period would be incorporated and defined by planning condition.

Cultural Heritage

6.9.39 An Archaeological Desk Based Assessment (prepared by RSK) accompanies the planning application. Historic environment record data indicates that no designated archaeological assets are recorded as being on the Site. The eastern portion of the Site is located within the Colne Valley Archaeological Priority Area (APA). Some non-designated assets are also recorded within the Site.

6.9.40 The presence of alluvial deposits in the site investigation borehole logs indicates that there may be some development impacts on non-designated geo-archaeological assets. Archaeological recording could be secured through a suitable worded planning condition on any consent that is granted. Appropriate archaeological measures would therefore be agreed and included in the CEMP.

6.9.41 Construction of the Proposed Development will have no impact on the significance of built heritage assets including locally listed buildings at Maylings Transport Yard or the Widewater Conservation Area.

6.9.42 The bridge over the Grand Union Canal (identified as Bridge No. 179) has been identified as a non-designated heritage asset by the Built Heritage Assessment (prepared by RSK) that accompanies the planning application. The Development will involve some changes to the fabric of Bridge No. 179, over the canal with the precise nature of these works to be determined pending further investigation. This will likely entail a sensitive repair and restoration programme to retain all salvageable historic fabric and replace any that is beyond reasonable repair with appropriate materials. This will retain the character of the bridge and its relationship with the canal network.

6.9.43 It is assumed that appropriate planning conditions would be in place to secure the above measures and that could also be addressed through the CEMP.

6.10 Monitoring

6.10.1 A programme of environmental monitoring will be implemented, before and during construction of the Proposed Development to provide a baseline position and monitor the efficacy of measures to protect ecological features and water resources. If monitoring indicates an issue or that mitigation is not effective, the proposals would be reviewed in consultation with relevant stakeholders and appropriate action taken should this be necessary. Monitoring is also proposed to demonstrate the effectiveness of the embedded mitigation measures and residual effects. The proposed monitoring programmes relevant to biodiversity and the water environment are outlined in Chapter 7: Biodiversity and Chapter 8: Water Resources and Flood Risk of the ES.

6.10.2 The Draft MEMP (see Appendix 7.4: Draft Mitigation and Ecological Management Plan (MEMP) Volume 1 and Appendix 7.5: Draft Mitigation and Ecological Management Plan (MEMP) Volume 2 Parts A-D) proposes appropriate monitoring to ensure that the targets for favorable condition are being met in response to the lake being a SSSI.

References

[1] UK Statutory Instruments, 2016. Environmental Permitting (England and Wales) Regulations 2016.
[2] Her Majesty's Stationary Office (1990). *The Environmental Protection Act 1990*.
[3] Her Majesty's Stationary Office (2016). *The Environmental Permitting (England and Wales) Regulations 2016.*
[4] Her Majesty's Stationary Office (2018). *The Environmental Permitting (England and Wales) (Amendment) Regulations 2018.*
[5] Her Majesty's Stationary Office (2011). *The Waste (England and Wales) Regulations 2011.*
[6] Her Majesty's Stationary Office (2014). *The Waste (England and Wales) (Amendment) Regulations 2014.*
[7] Her Majesty's Stationary Office (2006). *The Waste Management (England and Wales) Regulations 2006.*
[8] Her Majesty's Stationary Office (2005). *Clean Neighbourhoods and Environment Act 2005.*
[9] London Borough of Hillingdon. Available at: https://www.hillingdon.gov.uk/article/5157/Commercial-industrial-and-construction-noise#:~:text=Monday%20to%20Friday%2C%208am%20to%206pm
[10] Considerate Constructors Scheme. Available at: https://www.ccscheme.org.uk/
[11] British Standards Institution (2003), BS 5489-1:2003 Code of practice for the design of road lighting. Lighting of roads and public amenity areas.