LONDON CITY AIRPORT MASTERPLAN ENVIRONMENTAL APPRAISAL

OTHER ENVIRONMENTAL CONSIDERATIONS

JCG23745
LCY MASTERPLAN ENVIRONMENTAL APPRAISAL
Version 1
April 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
1	Appraisal report	P Coates	D Thomson	D Thomson	8-03-2019

Approval for issue

D Thomson  8-03-2019

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1 INTRODUCTION

1.1 London City Airport is preparing a Master Plan setting out its vision up to 2035. This report considers a range of environmental matters relevant to future changes, specifically dock water quality/biodiversity, waste disposal and heritage/archaeology. The information provided in this report is largely based on previous surveys and assessments and considers the actions and initiatives which can form part of future investment at the airport.

2 BASELINE APPRAISAL

Heritage and Archaeology

2.1 The site of the airport has undergone dramatic change since the last commercial maritime operations ceased in 1983, morphing from a port and industrial based landscape (with associated warehouse, jetties, cranes and associated infrastructure) to a dedicated modern airport and transport hub. While the maritime operations have ceased, the Royal Docks still provide a sense of heritage and community.

2.2 The area generally consists of urban development contrasting with the open areas of water of the Docks and the River Thames. Some isolated landscaped areas exist, however in most locations there is relatively little vegetation.

2.3 The airport is located within a London Borough of Newham (LBN) designated Archaeological Priority Area. As part of its updated Local Plan, LBN published an evidence-based report: Archaeology Priority Areas (Public Consultation Version 2, February 2015). This identifies the site as being located in a Tier 3 Archaeological Priority Area (Newham APA 3.3: Royal Docks).

2.4 There are no Scheduled Ancient Monuments within a 1km radius of the centre of the site, although there are eight listed buildings, namely;

- St Mark's Church, 4/31 Woolwich Road;
- North Woolwich Station (Pier Road) including turntable and platform lamp standards;
- Central Buffet at Custom House;
- Entrance to Woolwich Pedestrian Tunnel (Pier Road);
- Gallions Hotel;
- The Connaught Tavern;
- Central Offices at Custom House; and
- War Memorial at former St Marks Church.

2.5 The Royal Docks are not listed and are not within a designated Conservation Area.

2.6 Archaeological / Historic Environment investigation and recording has been undertaken as part of both the ES submitted in support of the CADP1 planning application in 2013 and subsequently in order to discharge pre-commencement condition 62: Archaeology. These investigations have been completed in accordance with a Written Scheme of Investigation (WSI) which has been agreed with the LPA's Archaeological Adviser (GLAAS) and approved by the LBN.

2.7 The baseline assessment completed in conjunction with the 2013 ES highlighted the prehistoric and later era archaeological potential of the Thames Valley and Royal Docks area. However, this also found that the original construction of the docks, being approximately 11m deep, would have severely impacted / truncated any significant archaeological features; either through the excavation of the docks themselves or through the construction of dockside structures and infrastructure.

2.8 The design and construction of KGV Dock was a response to changing demands, requiring the construction of a new dock, craneage, pontoons, rail tracks and storage warehouses able to facilitate the loading and off-loading of ships of up to 30,000 tons. It was the largest and most important of the works undertaken by the Port of London Authority and, when in use, had capacity to berth 14

large vessels. Site visits and historic building recording undertaken during the preparation of the CADP1 application confirmed that the there is little of that industrial heritage remaining, except for the pontoon ('Dolphins'), the coping stones on the edge of the Dock wall (some with metal mooring rings) and small sections of rail tracks to the far east dockside.

2.9 Previous site investigation works have determined that former dock and airport development activities have truncated/removed below ground archaeological potential within the airfield, runway and much of the southern dockside. Further investigation works were also undertaken as in order to discharge condition 62: Archaeology, of the CADP1 planning permission. These works have included geo-archaeological boreholes with sub-surface topographic modelling plus a 'Level 2' photographic record of KGV Dock. Watching briefs on the removal of Dolphin 7 and the dock wall coping stones were also undertaken in agreement with LBN and the Greater London Archaeological Advisory Service (GLAAS).

2.10 The geo-archaeological boreholes completed as part of the redevelopment scheme for the Western Energy Centre (with a 9m deep basement) determined that the level of development impact was such that no further on-site mitigation was required for this phase of works.

Surface Water Quality

Baseline Conditions

2.11 The bio-chemical quality of the water in the Docks is influenced by water pumped into it from in the tidal Thames. A number of activities at the airport also have the potential to affect water quality, as set out in the following section.

2.12 Surveys of KGV Dock were undertaken by RPS between 2010 and 2013; the aims of which was to measure certain water quality variables at different depths and locations within KGV Dock and to assess the potential impacts of the proposed CADP1 on the limnology of the Dock based on these results. This focused on two areas of KGV Dock: the area under the Eastern Apron (stands 21-24), and the open water area which will be covered by the new 7.5 Ha concrete deck constructed under CADP1. These surveys measured key water quality variables, including: temperature, oxygen, pH and water transparency, with respect to conditions for aquatic life, and recorded the limnology (stratification) of the water column identifying gradients in water chemistry (conductivity and salinity) to understand any influence that the River Thames has on the KGV Dock, together with seasonal changes.

2.13 As the CADP1 piling and deck construction works are presently ongoing, the water quality of KGV Dock may be influenced by these works (including higher levels of suspended sediment in the immediate working area). Regular monitoring of the water in the docks during the ongoing piling and deck works between June 2018 and January 2019 showed no significant deterioration in bio-chemical conditions compared to baseline readings taken before the works commenced. Furthermore, after the cessation of these works in 2020 it can be expected that the Dock will revert to its natural settled state – similar to that recorded in 2010 – 2013, when the water of the Docks was classified as 'Excellent Quality' for coastal and transitional waters, in accordance with EU Bathing Water Directive (2006/7/EC) and The Bathing Waters (Classification) Regulations 1991.

2.14 RoDMA monitors the water quality of the Royal Docks fortnightly and is also responsible for the maintenance of the marine infrastructure, impounding and the maintenance of water quality through dredging and the removal of litter, leaves and other floating debris. Measurements record the pH, conductivity, ambient temperature, transparency and dissolved oxygen saturation of the water. No

instances of a significant deterioration in water quality during the piling and deck works have been recorded by RoDMA to-date.

Operational Effects and Existing Mitigation Measures

2.15 A number of activities at the airport have the potential to adversely affect the water quality of the Docks. However, through utilisation of the airport's EMS (which is certified to ISO14001:2014), the impact of such activities is considerably reduced and effectively monitored.

2.16 Suitable infrastructure has been present for many years at the airport to minimise the risk of accidental discharges to the Dock as well as the volume of surface run-off overall. These include:

- A designated bunded area for fire training, including the provision of a separate foam drainage tank;
- Effective site-wide drainage system with built-in oil separator interceptors coupled with annual pressure tests of underground storage tanks;
- Comprehensive system of operational procedures to ensure that the risks of accidental spills and other contamination are minimised; and
- Dedicated spill response service to contain and clear any airside spills.

2.17 The methods of piling used in the CADP1 construction works have been selected to avoid pollution of the underlying groundwater and to minimise the disturbance of dock sediment and bed material as far as reasonably possible, thus reducing the risk of adverse effects on water quality. These techniques have been effectively used to date during construction of the deck over KGV Dock.

De-icer and Other Pollution Sources

2.18 During colder periods the airport uses antifreeze and de-icer. The discharge of these substances into waterbodies is known to reduce the level of dissolved oxygen in water available to plants and fish. In addition, the airport periodically uses pesticides and herbicides for habitat management on the airfield.

2.19 Given the airport's immediate proximity to the Docks, it has been exploring opportunities to manage the potential impacts from de-icer, pesticide and herbicide use more carefully. The airport has already trialled more environmentally friendly ground de-icers, which have much less effect on water quality less than traditional glycol-based alternatives. The fire teams have also trialled 'Fluorine Free Foam', which is proven to be a less damaging alternative than traditional Film-Forming Flouro Protein (FFFP) foam, most commonly used for firefighting.

2.20 The airport's existing drainage system is already effective in reducing the risk of potential contamination. With the extension of the apron in 2007, a new set of slot drains and pipes were constructed including a new fuel/oil interceptor. This has an automatic closure device, so that any pollution from the apron is detected and contained. This is supported by a comprehensive system of operational procedures to ensure that risks of accidental spills and other contamination are minimised.

2.21 In summary, to reduce the likelihood and environmental consequences of de-icer and other pollutants entering the docks or River Thames, the airport has a series of controls and measures in place which include:

- The use of more environmentally friendly de-icing fluid;

- Secure containment of de-icing fluid whilst not in use;
- The use of Glyvac (Glycol Vacuum) vehicles to clear up any excess de-icing fluid from the ground on stands after aircraft de-icing has been completed and the aircraft is taxiing off stand. These vehicles effectively 'suck up' de-icing fluid immediately after application to prevent it from entering drainage or watercourse;
- Disposal of all de-icing and anti-freeze liquids at a dedicated off-site recycling facility by a licensed third party;
- All activities are in line with the Airport's Surface Water discharge permit[1]; and
- Fortnightly sampling at a drainage outfall by a United Kingdom Accreditation Service (UKAS) accredited laboratory during the winter season (1st October – 31st March each year).

2.22 The airport is continuously exploring opportunities to improve management of de-icing activities without affecting airport operations or compromising the safety of airport employees or passengers. Such improvements will be made based on the close monitoring of the volume of de-icing liquid used and the amount of de-icing fluid recovered with the use of the Glyvac.

2.23 The future upgrades to the airfield drainage system under CADP1 incorporate an outfall control with a Biological Oxygen Demand (BOD) sensor to divert runoff to the Thames Water sewer. This will also include manual override, the use of which will be written into de-icing operational procedures in place at the airport

Ecology

Introduction

2.24 The airport has a generally low ecological and biodiversity value, largely due to it being an intensively managed facility that, by necessity, discourages animals including foraging and breeding birds, which may disrupt or endanger the safe operation of aircraft. The airport is required to comply with strict requirements set out by the Civil Aviation Authority (CAA) in terms of managing bird strike risk. As such, on site habitats must be carefully managed to minimise attractiveness to birds, particularly large species, to maintain a safe aerodrome at all times.

2.25 The airport and surrounding area are highly urbanised, dominated by the infrastructure including the terminal, runway, apron, ancillary buildings and car-parking space. The majority of the site therefore consists predominantly of buildings and hardstanding with very limited vegetation except for ornamental shrubs in the forecourt area and airfield grassland to the north of the runway. It is also recognised that there is limited potential for the airport to create or enhance some habitats due to the its limited geographical footprint and ongoing nature of operations.

2.26 Periodic ecological surveys of the airport site have been conducted in 2000, 2007, 2010, 2013 and 2015 which have all confirmed that the value of terrestrial ecology at the airport is low largely as a result of being an intensively managed airport facility. Additionally, the airport has undertaken a number of studies in accordance with Actions 8 and 9 of the original 2012 Biodiversity Strategy (as amended 2016) in order to explore the potential for ecological enhancements of the site.

[1] https://environment.data.gov.uk/public-register/water-discharges/registration/TH-EPRBB3390EY-001?__pageState=result-water-discharge-consents

2.27 KGV Dock and the Royal Albert Dock are wide open water bodies with no evident ecological features, except where the algal mat which encrusts on the dock walls is periodically exposed when the water level is allowed to drop (by up to 0.8m). However, the Royal Docks do support a thriving and relatively unusual mix of both sea and freshwater fish species, arising as a result of their depth and enclosure, and the fact that the dock water is brackish (part fresh and part saline), being sourced directly from the tidal River Thames.

2.28 The Royal Docks are part of the Green Corridor Network of Newham due to their association with the River Thames and its tidal creeks, situated about 500m to the south of the airport. For this reason, the river and the creeks are designated as a Site of Metropolitan Importance for Nature Conservation (SMINC).

2.29 The airport is not located within an environmentally sensitive/protected area, such as Special Area of Conservation (SAC), Special Protection Area (SPA), Nitrate Vulnerable Zone, Local Nature Reserve, Area of Outstanding Natural Beauty (AONB) or Site of Special Scientific Interest (SSSI).

Existing Planning Conditions and Commitments (CADP1)

2.30 A Sustainability and Biodiversity Strategy was prepared to discharge Condition 56 of the CADP1 permission. This condition is as follows:

56. Sustainability and Biodiversity Strategy

No Phase of the Development shall Commence until a Sustainability and Biodiversity Strategy has been submitted to and approved in writing by the Local Planning Authority in respect of that Phase.

The relevant approved Sustainability and Biodiversity Strategy shall be implemented on Commencement of the Development of each Phase.

A report shall be submitted to the Local Planning Authority annually on 1 June (or the first working day thereafter) as part of the Annual Performance Report on the performance and compliance during the previous calendar year with the targets in the approved Sustainability and Biodiversity Strategy/Strategies.

Every 3 years the Sustainability and Biodiversity Strategy shall be reviewed and the reviews shall be submitted to the Local Planning Authority for approval on 1 June (or the first working day thereafter) and implemented as approved.

Reason: In the interest of impacts on biodiversity and maximising the ecological potential of the site and in accordance with Policy SC4 of the London Borough of Newham Core Strategy (Adopted January 2012), Policies 5.11, 7.19 and 7.21 of the London Plan (consolidated with alterations Since 2011 and published March 2015), and Paragraph 109 of the NPPF.

2.31 The current version of the Sustainability and Biodiversity Strategy covers the period from 2017 until 2020 and sets out the targets and actions for the intervening years. This was submitted to the London Borough of Newham in March 2017 and subsequently approved. It will continue to be updated on a 3-yearly basis.

2.32 The Strategy will be implemented and monitored in accordance with LCY's environmental management system (EMS) which is independently accredited to the ISO14001:2015 standard. The accredited EMS covers the provision of airport operations, including both landside and airside activities as well as third parties that operate on site. By utilising this EMS, the airport seeks to continuously review and monitor its environmental performance in order to manage, and where possible minimise, the environmental impacts resulting from its activities including on ecology.

2.33 In regard to ecology and biodiversity, the existing Sustainability and Biodiversity Strategy has the following overarching objective which is set out in the section titled 'Wildlife and Habitat Management':

"To help protect, enhance and promote awareness of wildlife and habitat management at the airport and in the community."

2.34 However, in light of the operational, geographical and safety constraints which contribute to the airport's low ecological value, the biodiversity strategy primarily focuses on:

1. Supporting specific biodiversity enhancements off-site which are not deemed to pose a risk to the safety of the airport and associated operations; and
2. Promoting access to and appreciation of biodiversity in the wider community.

2.35 In the Borough of Newham, it has been identified that there is widespread deficiency in access to nature (27% deemed to be 'Areas of Deficiency'). The Council has identified 34 Sites of Importance for Nature Conservation (SINCS) outside the London Legacy Development Corporation area and a number of Priority Habitat classes have also been identified, including:

1. Public open space and green corridors;
2. Rivers and wetlands;
3. The built environment; and
4. Private grounds (including schools).

2.36 Based on this information, the airport has agreed to help to tackle biodiversity related issues in each of the habitat classes, for example:

- Public Open Space and Green Corridors - LCY supports educational programmes run at East Ham Nature Reserve, a key SINC in the borough, to promote environmental stewardship and knowledge of biodiversity in the local community; and
- Rivers and Wetlands/Private grounds (including schools) – LCY supports the charity Thames21 who will deliver a river related biodiversity and environmental stewardship programme to primary schools across East London.

2.37 The specific Wildlife and Habitat Management Targets set out in the Strategy include:

- **WH1**: Implement a state-of-the-art bird deterrent system, a quiet and less intrusive method of bird management at the airport by the end of December 2017.
- **WH2**: Investigate, produce and make publicly available safeguarding guidance for developers, which specifically details safe methods of increasing local biodiversity within developments without compromising aerodrome safety, by the end of December 2017.
- **WH3:** Provision of artificial substrate mesh for aquatic colonisation and the provision of shelter for fish fry within KGV Dock by mid- 2017 (see below).
- **WH4:** Continue providing £10,000 a year until 2018 to East Ham Nature Reserve to deliver an educational biodiversity and environmental programme for the local community. Following the completion of this programme and subject to the agreement between Newham and LCY, LCY will investigate opportunities to provide equivalent funding of £10,000 a year for a new biodiversity related project until January 2020.

- **WH5**: Fund other environmental and biodiversity projects with preference given to areas of nature deficiency. Subject to interest from schools and community groups, options could include (1) funding allotment boxes in SINCs; (2) enhancing biodiversity by installing bat boxes or hedgehog homes to protect these key species; or (3) funding biodiversity related projects in schools. Such projects would be subject to a combined annual funding of £5,000 pro-rata from the commencement of CADP until January 2020, or a sum to be agreed between Newham and LCY.

2.38 As part of the CADP1 permission there is a specific condition requiring the installation of artificial fist refugia (habitat) in the dock waters. This condition followed the assessment of the potential impact and proposed mitigation for the loss of sections of the dock wall as a result of the construction of the concrete deck over KGV Dock. The original assessment and outline design for the fish refugia was presented in Chapter 13: Ecology and Biodiversity of the Updated Environmental Statement (UES, September 2015).

2.39 This condition states:

68. Artificial Fish Refugia (Habitat)

The relevant Phase of the Development shall not be Commenced until a form of wire mesh sheeting (artificial fish refugia habitat) has been installed in King George V Dock in accordance with the Artificial Fish Refugia Details. The Artificial Fish Refugia shall thereafter be retained.

Reason: To improve aquatic ecology in King George V Dock and compensate for the loss of dock wall habitat arising from this Development.

2.40 The details of this artificial fish refugia are further described later in this report.

2.41 Condition 36 of the CADP1 permission includes the requirement to submit a landscaping scheme. This includes details of planting, which will contribute towards on-site biodiversity, whilst utilising species types that minimise bird attraction. An extract of this condition is provided below:

36. Landscape

Prior to the relevant Phase of Development Commencing full details of a landscape scheme to include all hard surfaces, grassed areas, tree and shrub plantings and the proposed times of planting, relating to that approved Phase, shall be submitted to the Local Planning Authority for approval in writing.

Each submitted landscape scheme shall be in accordance with the Landscape Drawings.

All landscaping schemes and all planting shall make such planting unattractive to birds so as not to have an adverse effect on the safety of operations at London City Airport by encouraging bird roosting and creating sources of food for birds, and thereby preventing a bird strike threat to aircraft operating at the Airport.

Terrestrial Ecology

2.42 The terrestrial habitats, plant and animal species at the site, as recorded in previous surveys, are summarised below. It should be noted that this information has not been updated by any recent surveys, but it is considered broadly representative of the habitats and species which exist today. Should there be any future planning applications accompanying EIA, additional surveys (both terrestrial and aquatic) will be undertaken to re-confirm the ecological status of the site.

Flora

2.43 Large linear strips of poor semi-improved grassland dominate the surroundings of the runway. The grassland is frequently mown and receives applications of herbicide for weed control. Species noted include Perennial Rye-grass *Lolium perenne*, Cock's-foot *Dactylis glomerata*, Ribwort Plantain *Plantago lanceolata*, Vetch species *Vicia* species, Yarrow *Actillea millefolium*, Curled Dock *Rumex crispus*, Herb-Robert *Geranium robertianum*, Fescue species Festuca species, Black Medick *Medicago lupulina*, Cow Parsley *Anthriscus sylvestris*, Broad-leaved Dock *Rumex obtusifolius*, Yorkshire fog *Holcus lanatus*, Cat's Ear *Hypochaeris radicata*, Dandelion *Taraxacum originates*, Spear Thistle *Cirsium vulgare* and Mallow *Malva sylvestris*.

2.44 There is a small section or areas of short perennial/ephemeral habitat including:

- Land to the south west of the terminal building. This habitat consists of shallow stony soil with scattered plant species such as Black Medick, Willowherb species Epilobium species and Mugwort *Artemisia vulgaris* – all typical of derelict urban sites;
- The margins of the northern side of KGV Dock and runway with stonecrops, mosses and lichens; and
- Moss dominated patches of land along the disused railway section at the southern side of KGV Dock.

2.45 Ruderal weeds such as Butterfly-bush *Buddleja davidi*, Spear Thistle *Cirsium vulgare* and Ribwort Plantain *Plantago lanceolata* are present along the south eastern corner of the site, around the operational and disused warehouses. Tall ruderals are also present along the car parks situated south of the Fire Station. There is also a strip of ruderal vegetation alongside the northern boundary of the site consisting of Butterfly-bush, Spear Thistle, Ribwort Plantain and occasional patches of Perennial Rye Grass.

2.46 There are a few scattered trees on the site including semi-mature London Plane *Platanus x acerifolia* running along the front of the Jet Centre car park. Other tree species, present in the scrub planting to the south of the Jet Centre, included Field Maple *Acer campestre*, Rowan *Sorbus aucuparia* and Ash *Fraxinus excelsior*. Juvenile trees were also present within the amenity hedge planting in the main terminal forecourt area including Cherry Prunus species and Sycamore *Acer pseudoplatanus*. Two Silver Birch *Betula pendula* were also present amongst the shrub planting outside of City Aviation House. Cabbage Palms *Cordyline australis* were present in raised planters.

2.47 The landscaping within the main terminal forecourt area consists of well-maintained Privet and Laurel hedges with the occasion juvenile Sycamore and Cherry.

2.48 None of the above plants are listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) or are otherwise of conservation interest, nor is it considered that the site contains habitat suitable to support statutorily protected species or species of conservation interest.

Terrestrial Invertebrates

2.49 No specific terrestrial invertebrate surveys of the airport have been undertaken to date. However, it is likely that the fragments of habitat present onsite support assemblages of locally common and widespread species typical of such environs in the borough of Newham and the London area. The lack of a varied grassland structure and composition, together with areas of bare and unmanaged ground, mean that many of the species of conservation interest which are typical of the Thames corridor are unlikely to be present on the site.

2.50 Records of Stag Beetle *Lucanus cervus* and the rare Streaked Bombardier Beetle *Brachinus sclopteta* were received from GiGL but all relate to records over 1 km from the Application Site.

Reptiles and Amphibians

No reptile or amphibian species were observed during the Phase 1 Habitat Surveys or the PEA referred to above.

Birds

2.51 The airport operates numerous bird scaring techniques to enable its safe operation and reduce the risk of bird strike, in accordance with CAA requirements. These are implemented by a Bird Control Unit managed by Airport Operations.

2.52 A variety of methods and equipment are used to deter birds from the airport and, particularly, those critical areas such as the runway where birds may endanger arriving and departing aircraft. These methods include simulating distress calls and using shell crackers to disperse any flocks. The airfield is regularly patrolled by vehicle to ensure that birds are not present, and measures are rotated to ensure that birds do not become habituated to certain methods. General habitat management is also undertaken to deter flocks of birds from settling and to ensure that habitat, such as areas of grassland and vegetation, occurring on site is as unsuitable as possible for breeding birds. This includes maintenance of grassy areas and the application of herbicide to prevent plants from colonising areas and reducing diversity in the grass sward. The areas where vegetation is present are regularly monitored as well as the area surrounding the airport to ensure that habitat is kept in an unfavourable state for roosting and breeding birds.

2.53 The landside areas of the airport are also considered to have limited potential for breeding birds, with most of those species observed during the walk over surveys (in 2007, 2013 and 2015) being common breeding species.

2.54 A few areas identified as having potential for nesting for common bird species include:

- Semi-mature to mature trees and areas of dense shrubs as part of the landscaping;
- The grassy runway surrounds which support ground nesting birds: Lapwing *Vanellus vanellus* regularly breed on the grassy runway surrounds, with up to five pairs having been recorded in the past (London Bird Reports). Skylark *Alauda arvensis* and Yellow Wagtail *Motacilla flava*, birds of conservation importance listed on the BoCC Red List, have also been noted as breeding at or near the airport in the past (London Ecology Unit 1991). A GiGL data search returned relatively recent (2010) records of Lapwing at the airport during the winter months, probably using the grassy surrounds of the runway and possibly roosting on the concrete dolphins in KGV Dock: all three species are uncommon as breeding species in London;
- The water edges of KGV Dock supports small numbers of breeding waterbirds and Coot *Fulica atra* were observed nesting within KGV Dock basin during the Phase 1 walkover survey. However, the vertical sides of the dock and lack of marginal vegetation means there is little opportunity for nesting birds; and
- The area of species poor semi-improved grassland that borders the runway was observed during the Phase 1 Habitat surveys of 2007 and 2013 to support singing Skylark and foraging Starling *Sturnus vulgaris* - both UK Biodiversity Action Plan (BAP) and London BAP

species and listed on the Red list of Birds of Conservation Concern (BoCC) (Eaton et al. 2009).

2.55 Peregrine *Falco peregrinus*, a species listed on Annex 1 of the EU Birds Directive and Schedule One of the Wildlife and Countryside Act 1981, is known to have bred in the vicinity of the airport (London Ecology Unit 1991) and may occasionally forage in the area. Records were received from GiGL of Peregrine in the breeding season within 2 km of the airport. However, no suitable nesting locations exist within the area.

2.56 Black Redstart *Phoenicurus ochruros*; a species listed on Schedule One of the Wildlife and Countryside Act 1981, is known to have bred in the vicinity of the airport site and the London Docklands was previously a breeding stronghold for the species. Records were also received from GiGL of Black Redstart in the breeding season within 2 km of the airport. However, no buildings present within the area of the airport are considered suitable for breeding Black Redstart.

2.57 Considering the size and location of the Royal Docks, they are not heavily used by waterbird aggregations during the winter. Small numbers of Mallard *Anas platyrhynchos*, Mute Swan *Cygnus olor* and Cormorant *Phalacrocorax carbo* and larger numbers of gulls do occasionally occur, as well as sizeable flocks of Great Crested Grebe *Podiceps cristatus* and a few Little Grebe *Tachybaptus ruficollis*. A factor in this scarcity is likely to be that the depth and sheer sides of the docks means that they support little or no floating aquatic vegetation which is an important food source to the majority of waterbird species. In the wider area of the Royal Docks several pairs of Common Tern are known to breed on rafts in Pontoon Dock, the southern extension of the Royal Victoria Dock (London Dockland Development Corporation).

Aquatic Ecology

Water Quality

2.58 Limnology is the study of the life and phenomena of fresh water bodies, especially still waters. Full limnology surveys of KGV Dock were last undertaken in August 2010, March 2011 and January 2013, although LCY and RoDMA continue to undertake monitoring of the biochemical conditions of the Dock on a regular basis.

2.59 The aims of the limnology surveys were to measure certain water quality variables at different depths and locations within KGV Dock and to assess the potential impacts of the CADP1 deck on these conditions due to covering over the open water. These surveys focused on two areas of KGV Dock: the area under the existing deck of the Eastern Apron (constructed in 2008) and the open water area which would be covered were the proposed CADP1 to go ahead.

2.60 The basis of the investigations was to use key water quality variables to describe any patterns and distributions in the condition of KGV Dock. Those selected were: temperature, oxygen, pH and water transparency, with respect to conditions for aquatic life and identifying any gradients in water chemistry; and, conductivity and salinity to understand any influence that the River Thames has on the Dock. Water samples were also tested for concentrations of nitrate and phosphate which provide a good indication of the availability of nutrients for the growth of phytoplankton (microscopic algae suspended in the water) and chlorophyll-a which is an indirect measure of the amount of phytoplankton

2.61 The sampling revealed that the water chemistry at the water surface was uniform across the open and covered areas. The profiles of oxygen, salinity/conductivity and temperature were also similar

in both open water and covered dock areas. In all cases, the profile was stratified at about 6-7m with the upper levels being well oxygenated and relatively low salinity/conductivity.

2.62 At 5-6m, a gradient was present where a notable drop-off in oxygen levels and a more gradual fall off in temperature occurred. There was also a significant increase in salinity and conductivity below this depth. This stratification pattern persisted over the autumn, early spring and winter of 2010, 2011 and 2013 respectively.

2.63 Using RoDMA's datasets (included those provided to LCY for 2018) it is calculated that the water has an average pH of 8.8, which is typical of such waterbodies. The temperature of the water in the upper water levels closely reflects the ambient air temperature, and generally only exceeds 15^{o}C in the period between mid-May to early October. The most recent data from both RoDMA and LCY indicates that, despite the ongoing construction works in the Dock, the water quality remains largely unchanged and is of Excellent Quality for coastal and transitional waters (2006/7/EEC and SI 2013 No. 1675).

Aquatic Invertebrates

2.64 In 2013 a survey was undertaken by RPS of the aquatic invertebrates living on the submerged section of KGV Dock wall in order to assess the invertebrate fauna living on this surface and to determine the impact of the CADP1 construction works on this biota

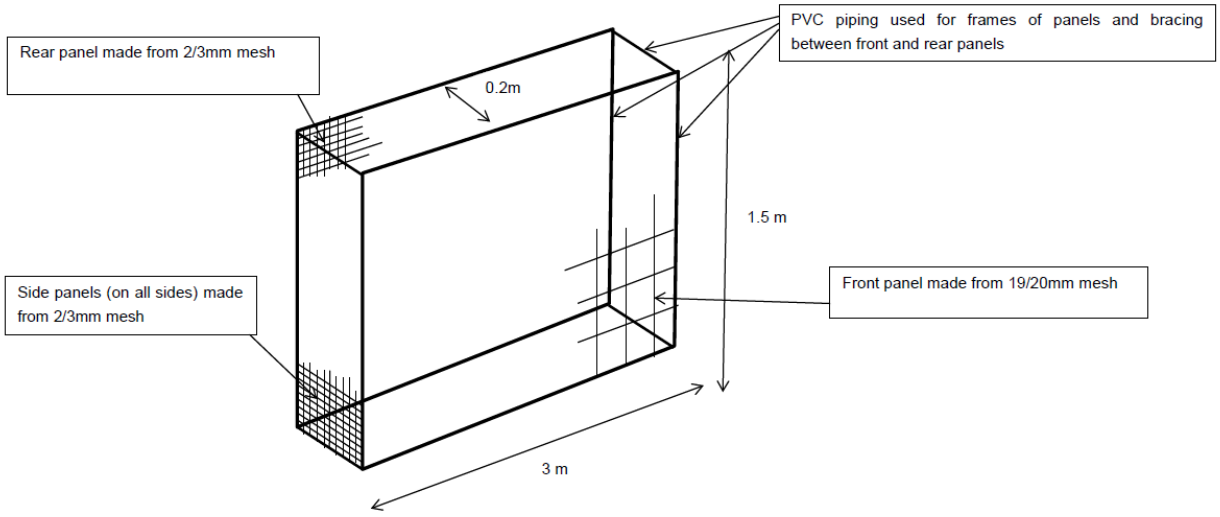
2.65 This survey recorded an abundance of aquatic invertebrates which are likely to be a food source for fish. These were identified and counted in a laboratory in order to describe the range of species present and to give an indication of their abundance and biomass. In particular, aquatic crustacean and polychaete worm fauna were found on the northern wall of KGV Dock. This constitutes a significant biomass and was assessed as being important for the maintenance of the Dock's ecology, the fish population in particular. Accordingly, the artificial fish refugia (described below) was designed to provide a suitable substrate for these species to live on, as compensation for the loss of sections of the Dock wall.

Fish

2.66 As mentioned earlier in this report, the Royal Docks support a variety of fish species such as Grey Mullet (*Chelon labrosus*), Tench (*Tinca tinca*), Pike (*Esox lucius*) and Sea Bass (*Dicentrarchus labrax*). This constitutes a relatively unusual mix of both sea and freshwater fish species, arising as a result of the docks location being transitional between saline seawater and freshwater. However, this is not untypical in the Lower Thames context and does not constitute a particularly sensitive or vulnerable mix of species. Notwithstanding this, the Updated Environmental Statement (UES) (September 2015) identified that the sudden loss of food by the destruction of the dock wall could have an adverse effect on fish abundance in the dock

2.67 To mitigate for the loss of the dock wall habitat, the UES proposed to introduce replacement substrates in the form of mesh sheeting (artificial fish refugia), suspended at the water's surface along two lengths of one of the Dolphins in the dock. With time the mesh is expected to colonise naturally with algae and, as the algae builds up as a layer on the mesh, it will create a crust-like structure which provides space for the invertebrates to shelter in. The crust would be composed of living algae, dead algae and other detritus, which would replicate that recorded on the submerged dock wall. The design of the fish refugia is illustrated in the sketch below:

Illustration of frame construction for fish refugia showing smaller mesh on the rear panel and larger mesh on the front panel (NOT TO SCALE)



2.68 The details of the design and propose of the fish refugia were further described in a report prepared by RPS (March 2017) in order to discharge of Condition 68: Artificial Fish Refugia (Habitat), as described previously. These details were subsequently agreed with the London Brough of Newham and RoDMA and the refugia were installed on a Dolphin in KGV Dock towards the end of 2017.

3 EFFECTS OF FUTURE GROWTH OF THE AIRPORT (2025-2035)

3.1 This section provides a high-level assessment of the potential future infrastructure enhancements envisaged as part of the airport Masterplan, and the impacts these may have on built heritage and archaeology; water qualityand ecology and biodiversity.

Heritage and Archaeology

3.2 As described in earlier sections of this report, there are a limited number of heritage assets in the vicinity of the airport with the exception of eight listed buildings which are with 1 km of the airport boundary. As the proposed works in the new master plan do not involve a substantial increase in height of infrastructure at the airport, it is considered that the setting of these listed buildings and other more distant heritage assets would not be impacted.

3.3 The airport is mindful of the need to preserve and reflect elements of the history of the Docks. Whilst not a formally listed heritage feature, the KGV Dock and its surviving pontoons ('Dolphins'), dock wall and adjoining dockside features, such as sections of old railway tracks, do have some heritage value. Therefore, the airport has invested considerable time and resources in surveying and recording these features and, where possible, will retain them in-situ within the airport development plans, now and in the future. The airport plans to promote the Royal Docks history by installing heritage boards and other signage detailing the history of KGV Dock within new public terminal buildings.

3.4 The previous assessment contained in the UES concluded that the construction of the deck over KGV Dock would affect the open characteristics of this undesignated heritage, contrary to London Plan policy. The magnitude of impact on the setting of the Dock was assessed as being 'moderate', with the overall effect on setting being a 'minor' effect. Any further extension of the deck would likely have a corresponding minor effect. However, this will be assessed in detail through the EIA process should there be any future planning applications..

3.5 Ongoing archaeological / Historic Environment investigation and recording has been undertaken in order to discharge CADP1 pre-commencement condition 62: Archaeology. These investigations have been completed in accordance with a Written Scheme of Investigation (WSI) which has been agreed with the LPA's Archaeological Adviser (GLAAS) and approved by the LBN. To-date little evidence of significant archaeology has been identified. However, the results of these and any future archaeological evaluations will be used to inform a further archaeological impact assessment completed as part of the EIA should there be any future planning applications..

Water Quality

3.6 The previous limnological studies (2010 - 2013) of KGV Dock identified that extending the apron out over more of the dock would be unlikely to alter the stratification or bio-chemical characteristics in the water column. In particular, this predicted that the upper water layers beneath the new apron would remain oxygenated due to void between the deck and the surface of the water and the influence of the natural flow and mixing of water within the docks. Once the new deck has been fully constructed, a further survey of the water chemistry will be undertaken to ensure that the water quality remains 'excellent'.

3.7 It is considered unlikely that the addition of three additional stands to the deck, as envisioned in the Masterplan would alter this status quo and that that there would be no loss in water quality due to de-oxygenation or other biochemical effects. However, this will be further evaluated during the EIA process should there be any future planning applications.

3.8 If after construction any degradation in water quality occurs, this could be rectified by the installation of aeration systems installed along the dock. This is an efficient way to transfer oxygen to the water body and could comprise a topside compressor which would pump air through a hose connected to an underwater aeration unit.

3.9 The airport will continue to monitor and report on water quality as part of its ongoing sustainability and environmental commitments and to report the results in its Annual Performance Report (APR). This will include the number of days antifreeze/ de-icer is used at the airport, the quantities applied, and monitoring the biological oxygen demand (BOD) content of dock water.

3.10 As there will be no additional use of herbicides and pesticides as part of the proposed Masterplan works, there will be no change in risk to water quality as referenced in the Water Framework Directive River Basin Management Plan.

3.11 It is envisaged that the reconfiguration of the airfield, drainage system and ancillary plant (such as the relocation of the fuel farm and de-icer store) will provide the opportunity to enhance pollution control features such as interceptors and bunds. This should further reduce the risk of accidental spills reaching the Dock.

Ecology

3.12 As the future physical infrastructure necessary to facilitate the growth of the airport will generally be confined to areas that have already been developed (including the airfield and southern dockside) no additional impacts on terrestrial ecology are envisaged beyond those assessed for the CADP1 UES. Also, as described in this report, the ecological value of the airport site is currently low and the potential to increase biodiversity on site is severely constrained by the need to discourage birds and other species that would present a risk to aircraft or otherwise conflict with CAA safety requirements. Notwithstanding, in accordance with Condition 36 of the CADP1 permission, an approved landscaping scheme for the dockside and new forecourt areas will be implemented, including the planting of indigenous plant species which contribute towards biodiversity whilst minimising bird attraction. These new landscaping areas will be monitored and managed to ensure their successful establishment.

3.13 New landside infrastructure will be accompanied by an updated landscape management plan, including details of planting, which will contribute towards on-site biodiversity, whilst utilising species that minimise bird attraction. This might include, where practicable, small trees, shrubs and grassed areas.

3.14 The current version of the Airport Sustainability and Biodiversity Strategy will be updated in 2021. At this juncture, new rolling targets and actions will be set for future years including additional initiatives that the airport could fund (or otherwise support) to enhance biodiversity off-site and to promoting access to, and the appreciation of, biodiversity in the wider community.

3.15 If the fish refugia concept proves to be successful and, as expected, colonises with a rich biota over the next few growing seasons, further fish refugia could be installed along additional dolphins within the dockside (i.e. those which would not be affected by future works) in order to compensate for any additional loss of dock wall. Periodic checks on the refugia are planned to take place to monitor their successful colonisation.

3.16 The airport is committed to continuing to work with the local community and LBN to support the wider protection, enhancement and understanding of wildlife and habitat management in the Borough. These include schemes such as educational programmes run at East Ham Nature Reserve, a key wildlife site/SINC in the borough, to promote environmental stewardship and knowledge of biodiversity in the local community. As well as this, the charity Thames21 deliver a river related biodiversity and environmental stewardship programme to primary schools across East London.

4 CONCLUSION

4.1 The evaluation presented within this report identifies that there will likely be no significant adverse effect on heritage and archaeology, water quality or ecology and biodiversity as a result of the future growth of the airport in accordance with the Masterplan.

4.2 However, the impacts will be further assessed as part of the EIA should there be any future planning applications..