

Chapter 13: Mitigation and Monitoring

INTRODUCTION

13.1 Table 13.1 below provides a summary of all the mitigation measures and monitoring commitments detailed within this *ES (Volumes 1-3)*.

13.2 The ways in which the identified mitigation measures and monitoring commitments could be secured is for the RBC to determine. This is stipulated in Section 70(1)(a) of the Town and Country Planning Act 1990 which enables the Local Planning Authority in granting planning permission to impose conditions on the planning permission “as they think fit”. It is recognised that, it is good practise for planning conditions to be discussed and agreed between a Local Planning Authority and an Applicant, before they are imposed.

Table 13.1 Mitigation and Monitoring Schedule

Paragraph reference within ES Chapter	Summary of Mitigation Measures
Chapter 4: Proposed Development	
4.112	Water efficient fixtures and fittings will be implemented as mitigation as part of the Proposed Development
4.113	TWUL will be consulted and may need to carry out flow and pressure tests for daily demand estimations when the planning application for the Proposed Development is submitted. This will assess the available capacity in the local supply network and determine whether any additional mains laying is necessary to support the Proposed Development and provide an indication of any cost of upgrades to the network. This would be undertaken as part of the detailed design stage, as required.
4.115	TWUL will be contacted regarding connection to the sewer network. It is likely that TWUL will need to undertake an assessment to determine the capacity of the local network and the point of connection and will identify any requirement to upgrade the local network.
Chapter 5: Demolition and Construction	
Enabling Works	
5.9	The enabling works and site set-up will involve utility diversions and the removal of any asbestos from the existing adjacent occupied buildings. The following pre-commencement surveys and investigations are envisaged: - Condition survey of any adjoining party walls and boundary walls; - Structural surveys of existing buildings; - Asbestos survey of existing buildings; - Topographical survey to confirm existing site levels; - Utility surveys to determine the position of any assets; and - CCTV survey of the surface water and foul water drainage to confirm size and condition.
5.10	License for discharge of water from the site into the public sewer if required
5.11	Any required diversions will be implemented in advance of the construction works, in compliance with all statutory notifications and required provisions.
5.15-15.18	The boundary of the Phase 1, Phase 2 and Phase 3 works will be established and 2400mm high hoarding will be constructed around the works. The hoarding will stay fixed in position until handover and the progressive occupation of Phase 1 (Blocks A, B and C) in sequence. Individual site areas will be hoarded and secured with acoustic Noise Reduction Hoarding panels. Where scaffolding is erected monarflex sheeting will be erected around the perimeter of the area, providing screening and protection to site users.
5.20 – 5.21	Safe site access routes will be provided throughout the duration of the construction programme, with segregated vehicle and pedestrian routes by use of fixed barriers. There will Also be designated protected walkway to the neighbouring Hexagon Theatre and Arts Venue from Hosier Street and Dusseldorf Way.
Demolition Works	
5.25	The works required will be regularly reviewed with the retail mall owners and management company to ensure that all works are clearly identified with procedures agreed to ensure that the health and safety of all personnel (i.e. visitors, retail workers etc.) using the existing mall is maintained
Excavation and Substructure Works	
5.26	Piling will be the undertaken via the Continuous Flight Auger (CFA) piling method, which is the quietest form of piling and is a cast in-situ process. Piling will be undertaken into and through the ground. Pile sleeves will be used where necessary to prevent collapse through any weak strata All substructure reinforced concrete works will be progressively installed following the installation of pile caps. This will include the lift pits, any sumps, pumps and reduced level plant rooms.
5.28	Where ground water is encountered during any piling operations within the basement to construct the foundations for the tower cores and tower crane bases, dewatering will be undertaken, pumping will be carried out using silently operated pumps. Ground water sediment/settlement tanks will be utilized with all necessary environmental controls implemented.
Construction Works	
5.29	Where practical, prefabricated elements (i.e. such as stairs) will be delivered to site give site constraints, to minimise on site labour required to erect the cladding, ease logistics, and to optimise/reduce the programme period.
5.31	Access to allow the external cladding components will be by mast climber and where necessary at higher (set back) levels scaffolding platforms will be erected.
5.36 – 5.37	The temporary use of tower cranes for the demolition and construction works would not exceed a height of 60m above ordnance datum (AOD) and would not infringe any safeguarding obstacle limitation surface. Fixed red aeronautical obstacle lighting to the jibs of the tower cranes will be provided. Crane arcs for the tower cranes will be controlled to prevent oversail of the public realm, highways and neighbouring properties.
5.38	The building facades will constitute cladding panels. It is envisaged that off-site manufacture of these panels will be utilised as far as reasonably practical with feasibility studies undertaken to test the benefits to programme of lifting in complete floor height units as the frame progresses. The use of off-site manufacture reduces the construction period for the erection of the external envelope and in turn reduced the period of crane time required to erect the structural envelope.
Construction Waste Generation	
5.55	100% recycling of inert waste from demolition and construction is targeted. Excavation spoil/material will be 100% reused off site unless contamination is identified, in which case the preferred course of action will be treatment and re-use. Deep landfill or incineration will be utilised as a last resort if necessary.

Hours of Operation	
5.58	The core site working hours for demolition and construction works will be as follows: • 08.00 to 18.00 weekdays • 08.00 to 13.00 Saturday • No working on Sunday or Bank Holidays
Transport	
5.60	The preferred transport routes to and from the site during the construction period for deliveries of materials to the site and for the removal of wastes will be agreed with the RBC prior to commencement of construction works
5.61-5.63	As the site is located adjacent to A329, it is considered that this would be the preferred route to be used by construction lorries travelling to and from the site. The A329 allows access to strategic arterial roads, such as the M4, and therefore avoid local residential roads. Access and egress to Phase 1 & 2 will be via the A392 then into Castle Street and into St Marys Butts. Access and egress to Phase 3 will be via the A392 then into Friar Street then into Cheapside and onto Oxford Street. RBC will be consulted prior to the commencement of construction works regarding the provision of direction signage on the surrounding road network to avoid vehicles using inappropriate routes to reach the site.
Chapter 6: Socio-Economics	
Completed Development	
6.127	The Proposed Development will result in Community Infrastructure Levy payments which will be used by the Council to support and manage the impacts of development by funding infrastructure such as new schools, open space improvements and health infrastructure. This will ensure that local facilities have sufficient capacity to service its expanding population.
Chapter 7: Air Quality	
Demolition and Construction	
7.84	• Communications: – develop and implement a stakeholder communications plan that includes community engagement before and during work on site; – display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager; and – display the head or regional office contact information. • Dust Management Plan: – Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management. • Site Management: – Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken; – make the complaints log available to the local authority when asked; – record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book; and – hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes. • Monitoring: – Undertake daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the site boundary, with cleaning to be provided if necessary; – carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked; and – increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust area being carried out and during prolonged dry or windy conditions. • Preparing and Maintaining the Site: – Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible; – erect solid screens or barriers around dusty activities or the site boundary that are as at least as high as any stockpiles on site; – fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period; – avoid site runoff of water or mud; – keep site fencing, barriers and scaffolding clean using wet methods; – remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below; and – cover, seed, or fence stockpiles to prevent wind whipping. • Operating Vehicle/Machinery and Sustainable Travel: – ensure all vehicles switch off their engines when stationary – no idling vehicles; – avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable; – produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and • Operations: – Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems; – ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate; – use enclosed chutes, conveyors and covered skips; – minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and – ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

	- Waste Management: - No bonfires and burning of waste materials. - Measures Specific to Demolition: - Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust); - ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground; - avoid explosive blasting, using appropriate manual or mechanical alternatives; and - bag and remove any biological debris or damp down such material before demolition. - Measures Specific to Construction: - Avoid scabbling (roughening of concrete surfaces), if possible; - ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place; - ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and - for smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust. - Measures Specific to Trackout: - Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use; - avoid dry sweeping of large areas; - ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; - inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable; - record all inspections of haul routes and any subsequent action in a site log book; - install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems or mobile water bowsers, and regularly cleaned; - implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); - ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and - access gates should be located at least 10 m from receptors, where possible.
Chapter 8: Noise and Vibration	
Demolition and Construction – Noise associated with works	
8.42	The hours of work will be limited to: 08:00-17.30 weekdays; 08:00-13:00 Saturdays; and - No works on Sundays or bank holidays.
8.100	The CEMP will include monitoring of the levels of noise during the construction phase. The following good practice measures should be incorporated into the CEMP to help control noise and vibration emissions from the site: - Regular communication between the contractor and affected neighbours so as to clearly understand the anticipated level and duration of noise throughout the construction period. Where excessive noise cannot be avoided, adjacent neighbours should be notified as to when such noisy works will be undertaken and these times adhered to. - Adequate planning should be undertaken within the project to prevent noise emissions from double handling of materials and overlapping of high noise activities. - Loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials around the site are to be conducted in a manner as to minimise noise generation. Vehicles should be switched off when not in use. The use of reverse beepers shall be avoided as far as is practicable with safe operating practices. - Compressors should be 'sound reduced' models, fitted with properly lined and sealed acoustic covers, to be kept closed whether the machines are in use. All percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturer. - All machines in intermittent use shall be shut down in the intervening periods between works if possible, or throttled down to a minimum. - Where possible, equipment should ideally be powered by mains electricity in preference to locally powered sources such as diesel generators. Hand tools to be electrically powered. - To minimise breakout and as far as is practically possible when taken against the scope of works, ensure that all external windows and doors to the existing building are kept closed. - No radios or similar noise-producing entertainment devices. - Contractors should belong to the Considerate Contractors Scheme.
Demolition and Construction Works – Vibration associated with construction works	
8.80	The proposed piling method to achieve this is via use of a Continuous Flight Auger. The levels of vibration associated with this type of augering are minimal as the process relies on slow steady motions.
8.81	The minimum distance between a vibration sensitive receiver and location at which piling may take place is 18m.
Completed Development – Building Services Plant	
8.82	Any proposed new fixed building services plant associated with the Proposed Development shall be specified such that the total cumulative Rating Level from the proposed building services items, as determined in accordance with RBC enforcement criteria, does not exceed 10 dB below the background noise level at the nearest sensitive receptors.
Completed Development	

8.83	Cumulative noise contributions from the building services scheme, including future provision for the commercial units created as part of the Proposed Development at low-level, will be controlled through the selection of adequate items of plant and the provision of suitable attenuation and screening packages if required.
8.106	A combination of internal operational noise control, building envelope design and any other required measures applicable will be applied, depending on the proposed future use of the Proposed Development commercial units along Dusseldorf Way.
Chapter 10: Wind Microclimate	
10.80	Further localised mitigation measures would be required to mitigate strong winds and to provide calmer and safe wind conditions. Wind mitigation measures could be in the form of additional soft landscaping elements and/or additional trellises/canopies which would provide shelter. Further wind tunnel testing would be required to verify the effectiveness of additional measures.
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10.108	Mitigation measures required for the completed development would be installed during construction prior to completion of the Proposed Development.
ES Volume 3: Appendix Scoping Report	
Phase 1 Environmental Desktop Study	
5.1	The site requires further evaluation by carrying out a geotechnical ground investigation in order to assess the risk of instability due to soluble rock. Any ground strengthening works which may be required will be developed once the findings of the intrusive ground investigation are made available.
Preliminary Ecological Assessment	
4.7	Where the proposed works require the removal of ledges within the basement or works to the facades of the buildings with potential to support nesting feral pigeons, this must be preceded by a nesting bird check completed by a suitably qualified ecologist within 48 hours of the works, to confirm the absence of nesting feral pigeons. Should they be present, the nest and a suitable buffer of habitat around it must be retained until the young have left the nest. A licenced pest control contractor specialised in the removal of pigeons may be contacted to provide further advice, as they may be able to facilitate the removal of feral pigeons prior to works under a licence.
4.8	In the unlikely event that any protected species are found during construction, works must stop immediately and advice sought from a suitably qualified ecologist on how to proceed
Historic Environment Assessment	
7.1.5	Although the precise details would need to be agreed with the local authority's archaeological advisor, it is suggested that the most appropriate investigation strategy is likely to entail geoarchaeological boreholes to determine the depth of the underlying deposits in the areas outside of the existing basement. The results would be used to target further archaeological evaluation as necessary to confirm the presence, nature and significance of archaeological remains. This would in turn enable an informed decision to be made in respect of an appropriate mitigation strategy for any significant archaeological assets, such as targeted excavation, and / or a watching brief during ground works for remains of lesser significance. This would ensure that significant archaeological assets are not removed without record.
7.1.6	Any archaeological work would need to be undertaken in accordance with a Written Scheme of Investigation (WSI) and could be carried out under the terms of a standard archaeological planning condition set out with the granting of planning consent.
Mitigation Register – Water Resources	
Table F.1 Water Resource Mitigation Register	Sediment in Runoff
	- The following mitigation measures for sediment in runoff will be embedded within the CEMP and implemented during the Site works: - Site access points will be regularly cleaned to prevent build-up of dust and mud; - Earth movement will be controlled to reduce the risk of construction silt combining with the Site surface water runoff; - Properly contained wheel wash facilities will be used where required, to isolate sediment rich runoff; and Drainage of surface runoff and de-watering effluents to settling tanks to remove suspended solids prior to discharge to sewer or removal by a suitably licenced waste operator.
	Leaks and Spillages of Contaminants
	The following measures will be implemented, where possible: - Implementing control procedures during delivery or movement of service materials; - The drainage system will have cut-off measures that will allow a spill to be contained within the Site, so that it can be effectively controlled and managed without leading to off-site effects; - An Emergency Response Plan will be put in place; - Education / information on waste treatment / emergency events/spills etc. can be provided to the building servicing staff and building occupants as appropriate; and - Oil interceptors would be used in association with the drainage network in high-risk areas to reduce the potential risk for contamination. The appropriate utility company would be consulted on the potential requirement for an oil interceptor at the point where site surface water runoff enters the combined sewer.
	The following mitigation measures will be embedded within the CEMP and implemented during the Site works: - Spillages and leakages will be immediately contained in line with an emergency response plan and managed through the use of geotextile bunding of adequate capacity (110%) to isolate and minimise the ingress of surface water runoff to non-decommissioned boreholes or exposed surface water drainage pipes. Valves and trigger guns will be protected from vandalism and kept locked when not in use; - An emergency spillage action plan will be produced, which site staff will have read and understood. On-site provisions will be made to contain a serious spill or leak through the use of booms, bunding and absorbent material; - Wherever possible, plant and machinery will be kept away from the drainage system and will have drip trays beneath oil tanks/engines/gearboxes/hydraulics which will be checked and emptied regularly via a licensed waste disposal operator; - Following the discharge of surface runoff and de-watering effluents to settling tanks the drainage would be routed to oil interceptors prior to discharge to sewer; - The majority of concrete used will be pre-mixed and delivered from an off-site source, thereby negating the need to mix concrete on-site and reducing the creation of alkaline wastewater. Any mixing and handling of wet concrete on-site will be undertaken in designated impermeable areas, away from any drainage channels or surface water; - A designated impermeable area will be used for any washing down or equipment cleaning associated with concrete or cementing processes and wastewater will be discharged to the foul drainage system (with approval from TWUL) or contained and removed by tanker to a suitable discharge location by a suitably licenced waste operator; and

	The proposed drainage/service runs will be surrounded by appropriate granular bedding materials and located above the static level of any shallow groundwater. The drainage network installed as part of the Proposed Development will be constructed to meet with Building Regulations 2000, Part H. All liquids and solids of a potentially hazardous nature (e.g. diesel fuel, oils and solvents) are to be stored in designated locations with specific measures to prevent leakage and release of their contents, include the siting of storage area away from surface water drains, on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain 110% of the contents, in accordance with the EA's requirements. Any tanks storing more than 200 litres of oil on-site, would have secondary bunding. All storage will be protected from vandalism and kept locked up when not in use. Wherever possible, plant and machinery will have drip trays beneath oil tanks/engines/gearboxes/hydraulics, which will be checked and emptied regularly via a licensed waste disposal operator. On-site provisions will be made to contain a serious spill or leak through the use of booms, bunding and absorbent material in accordance with an Emergency Response Plan (ERP).
	Refuelling and delivery areas will be located away from the local sewer network drains.
	Disturbance of Existing Drainage Systems and Water Supply Network
	The following mitigation measures will be embedded within the CEMP and implemented during the Site works: - All existing utilities will be identified and marked prior to works commencing; - Signs will be used to warn of the presence of utility infrastructure; and Any damage to the drainage network will be immediately repaired.
	Groundwater Flow and Quality
	The preparation of a Piling Method Statement which will detail the depth and type of piling to be undertaken and the methodology by which such piling will be carried out, including measures to prevent and minimise the potential for damage to subsurface sewerage and water infrastructure and to demonstrate appropriate design and piling methods to avoid linking shallow and deep groundwater.
	The following mitigation measures will be embedded within the CEMP and implemented during the Site works: - Pile casing will be used during piling and the area around the piling will be isolated from surface water until piling is complete; - Any existing boreholes found on-site would be decommissioned; - If perched groundwater is encountered during establishment of basement and core foundations dewatering may be required. The most appropriate methods to dewater excavations will be selected, for example, prior to dewatering the perimeter of the excavation could be enclosed with either sheet-pile or a diaphragm wall. Piezometers (standpipes) could then be placed outside the sheet pile wall to monitor groundwater levels; - In the event that ground contamination is discovered, work will stop immediately and measures will be taken to prevent disturbance and mobilisation of contaminants, until the contamination has been treated in-situ or removed for off-site disposal or treatment; - If contaminated soils are encountered at the position where piling is due to be undertaken, then these materials should be removed prior to piling in order to prevent the dragging of contaminated soils with the piles to depth; - Contaminated soil requiring disposal will be excavated and kept separate from other soil and waste materials in protected temporary stockpiles prior to disposal; - Water arising from excavations will be disposed of to the local sewer network (subject to agreement with the appropriate authority) if uncontaminated and following the removal of silt via settlement ponds or alternative measures. All existing utilities will be identified and marked prior to works commencing; and Damp-proof membranes will be incorporated into the construction. These membranes will prevent the ingress of groundwater and reduce the risk of contaminants from reaching underground strata or groundwater. The watertight basement will therefore prevent any interior leaks or spillages from freely percolating into the shallow groundwater.
	Appropriate methods to dewater excavations are to be selected to ensure that groundwater does not drop below the critical level. Groundwater level monitoring will be undertaken as necessary to assess deformation and stability of surrounding structures, including neighbouring property.
	Seepage analysis and groundwater level monitoring will be carried out as appropriate to assess deformation and stability of surrounding structures, including neighbouring property, as considered necessary.
	Temporary Settlement and Surface Water Drainage
	Temporary drainage facilities will be provided during the construction phase, where necessary, to ensure controlled discharge of surface water runoff.
	It will be a requirement to ensure that runoff from the Site does not cause pollution or flooding. Measures that will be considered for implementation for temporary drainage through the construction design and/ or CEMP include: Site access points will be regularly cleaned to prevent build-up of dust and mud: Oil interceptors to be installed (notably the outflow from the settlement pond/ tank) to reduce the potential risk for contamination of groundwater and surface water; and All potentially polluted waters (including washdown areas, stockpiles and other areas of risk for water pollution) to have separate drainage and to be tankered away from the Site.
	In addition, if monitoring demonstrates unsatisfactory levels of solids or other pollutants, measures will be implemented to control suspended solids or other polluted discharge to watercourses (e.g. changes to Site drainage and settlement facilities and/or use of flocculants).
	Foul Drainage
	A connection to the foul sewer will be needed for sanitary connection from offices/admin/welfare facilities. It is possible this connection may also be licensed for discharge of process effluent in abnormal circumstances if required.
	Flood Risk
	The CEMP will incorporate measures to prevent an increase in flood risk or pollution during the construction works, in addition to the provision of temporary settlement and drainage measures (where required).
	Water Demand
	The following measures will be implemented: - Selection and specification of equipment to reduce the amount of water required; - Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both on-site and within Site offices; - Use of recycling water systems such as wheel washes, Site toilets hand wash; and Use of a rainwater harvesting system for use in equipment and vehicle washing.
	The water consumption throughout the construction works will be monitored, either through sub-metering or reading of utility bills, to allow comparison against best practice benchmarks and improvements to be made.
	Wastewater Generation
	The installation of water efficient fixtures and fittings can help further reduce the volume of foul water generated on-site.

	Any waste effluent will be tested and any water that may have come into contact with contaminated materials or be identified as being contaminated, will be disposed of appropriately and, to the satisfaction of the EA and/or TWUL; and where necessary, disposed of at the correctly licensed facility by a licensed specialist contractor/s.
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