Gatwick Airport Northern Runway Project

Environmental Statement
Appendix 5.3.2: Code of Construction Practice Annex 1 – Water Management Plan - Clean Version

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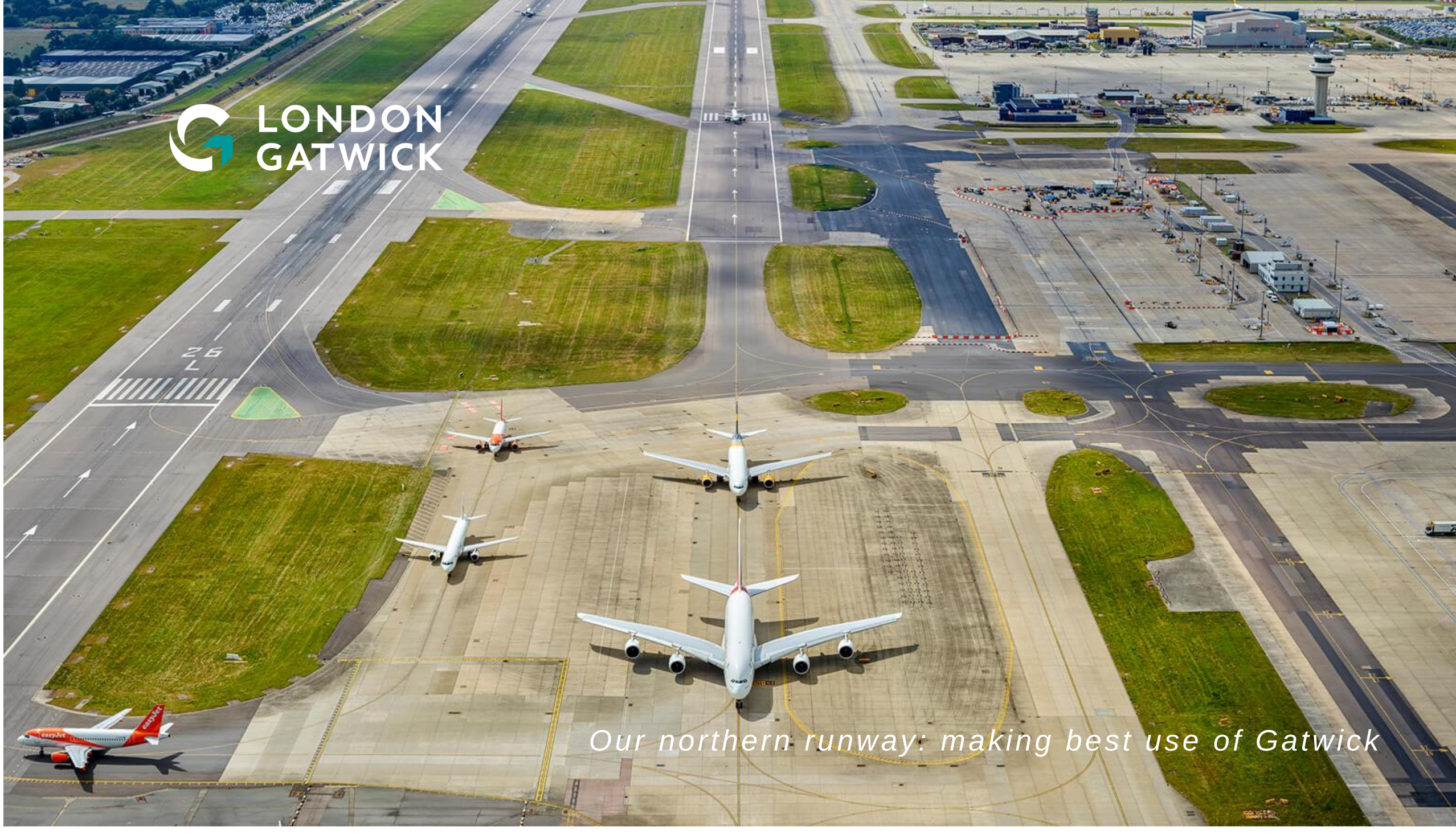

Our northern runway: making best use of Gatwick

Environmental Statement
Appendix 5.3.2: Code of Construction Practice Annex 1 - Water Management Plan

July 2023

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1 Background to the plan

1.1 The Project

1.1.1 The Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) process for the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project'). The Project proposes alterations to the existing northern runway which, together with the lifting of the current restrictions on its use, would enable dual runway operations. The Project includes the development of a range of infrastructure and facilities which, with the alterations to the northern runway, would enable the airport passenger and aircraft operations to increase. Further details regarding the components of the Project can be found in the **ES Chapter 5: Project Description** (Doc Ref 5.1).

1.1.2 Land would be used to mitigate environmental effects (for example, for habitat creation, flood compensation or provision of recreational routes and public open space).

1.2 Purpose

1.2.1 The ES contains the assessment of the potential impacts on the environment that may be caused during construction, operation and maintenance of the proposed scheme and describes proposed mitigation measures to avoid, prevent, reduce or, where practical and appropriate, offset the potential environmental impacts associated with the construction of the Project.

1.2.2 The **ES Appendix 5.3.2: Code of Construction Practice (CoCP) (Doc Ref 5.3)** is based on the design for which development consent for the proposed scheme is sought. The CoCP identifies environmental risks, their associated control measures, compliance and corrective actions, including procedures for communication, monitoring, audit mechanisms and reporting of control measures. The CoCP provides details on roles and responsibilities, consents and permissions, the collection and submission of environmental data, and induction, training and briefing procedures for those carrying out the proposed scheme.

1.3 The Water Management Plan

1.3.1 This Water Management Plan (WMP) is Annex 1 to **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref 5.3) of the ES and sets out the measures that will be used by the Principal Contractor (PC) to mitigate potential adverse impacts on the water environment during construction of the proposed scheme.

1.3.2 This WMP will be complied with during construction and will inform the land drainage consent and environmental permit applications required for the construction of the Project.

1.3.3 The purpose of this WMP is to detail the water management principles and procedures to:

- Prevent the pollution of and contamination to groundwater and surface waters
- Protect and preserve the hydromorphological and ecological elements of watercourses and water resources
- Plan how water would drain from the site during construction
- Identify measures to mitigate the risk of flooding as a result of the construction of the proposed scheme
- Identify measures for the sustainable use of water

1.3.4 The following documents include contextual information:

- The requirements of relevant environmental legislation listed in Section 11.2 of **Chapter 11: Water Environment of the ES** (Doc Ref 5.1).
- **ES Chapter 11: Water Environment** (Doc Ref 5.1). details essential mitigation measures to be implemented during construction of the proposed scheme, where they are required..
- **ES Appendix 11.9.6: Flood Risk Assessment** (FRA) (Doc Ref 5.3),:Section 7.5
- Any conditions of environmental permits, consents, licences or other permissions, as per the **List of Other Consents and Licences** (Doc Ref 7.5).

1.3.5 Relevant environmental information and any other consents or licences will be complied with in the construction and operation of the Project.

1.3.6 The proposed scheme will be executed in a manner compliant with the WMP. Certain activities may require third party approval of specific construction tasks as required by the Protective Provisions in the DCO or other permissions that are not disapplied by the DCO, see the **List of Other Consents and Licences** (Doc Ref 7.5).

1.3.7 The land drainage consent applications and/or environmental permits will require the following details:

- To manage the risk of pollution to surface waters and groundwater by capturing and treating construction site runoff, to ensure that it can be discharged into the existing networks or directly to a watercourse.
- To manage water removed from cuttings, borrow pits and other excavations during the construction dewatering activities.
- To manage the risk from groundwater flooding (during excavation) through appropriate working practices and with adequate plans and equipment in place for dewatering to ensure safe dry working environments.
- For the management of activities within floodplains or near watercourses (i.e. kept to a minimum), with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable or allowances made for floodplain control measures and contingency actions.
- Consideration of predicted overland fluvial and surface water flood flow paths to ensure they are maintained during construction and safe for construction teams.
- To control the storage, handling and disposal of potentially polluting substances during construction and reduce the risk from chemical spillages alongside emergency response procedures.
- To identify appropriate methods and mitigation measures when undertaking works within, over, under and adjacent to water bodies.

1.3.8 Any mitigation measures would be in keeping with the objectives, requirements and mitigation measures set out in this WMP. This would include keeping 'contaminated' construction runoff water separate from groundwater and surface water receptors, trapping and removing fine sediment from construction runoff, and managing chemical spillages.

2 Document Control

2.1.1 Future changes that occur as a result of any additional environmental information obtained during the detailed design and construction phase, changes in legislation, policy and best practice and any lessons learned on the Project would be reflected in contractor's method statements.

2.1.2 It would allow for the inclusion of any further conditions and amendments that arise from: the granting of any temporary works environmental permits, licences and consents; a review of environmental monitoring results; or the legitimate concerns of

Third Parties. It is proposed that the WMP is reviewed by the PC to ensure adequacy under the following circumstances as a minimum:

- On the granting of or any relevant variation to the environmental permits, licences and consents as applicable to the water environment required for the proposed scheme.
- Should there be any relevant changes to proposed works, for example methodology, and/or site-specific activities.
- Relevant changes to the approved plans of the DCO, environmental permits or other consents where the risk to the water environment from the works may change.

3 Responsibilities

3.1.1 In relation to the control and management of construction works to prevent pollution of surface and groundwater, or mitigate physical impacts to water bodies, the PC would establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of the **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref. 5.3). The following responsibilities would apply as a minimum:

- All personnel and subcontractors working on the project would perform their duties in accordance with the requirements of the WMP.
- The Environment Manager would report regularly to the Project Manager on the status and effectiveness of the implementation of the WMP.
- The Environment Manager and associated environmental team would be responsible for implementing water quality monitoring, where required, throughout the construction phase of the proposed scheme.

3.1.2 The Environment Manager and associated environmental team would have powers to stop, or request a change to the method statement of, any works they consider are not compliant with this WMP or are causing or are likely to cause pollution. They would work closely with project managers and the contractors carrying out the relevant works to discuss any concerns.

4 Surface Water Context

4.1.1 The Project is located within the Mole Management Catchment and more specifically crosses the Mole Lower and Rythe and Mole Upper Trib Operational Catchments. The River Mole originates south of Crawley in West Sussex and flows through Surrey for approximately 80 km before reaching the Thames at Molesey. The catchment of the River Mole has an area of 512 km2, and forms five per cent of the Thames catchment area. The watercourses potentially impacted by the Project during construction are in sub-catchments of the River Mole, including the Mole (upstream of Horley), Gatwick Stream, and Burstow Stream.

4.1.2 The Project potentially impacts five Main Rivers; these are: the River Mole; Crawter's Brook; Gatwick Stream; Withy Brook and Burstow Stream Tributary (north/downstream of the M23 Spur). In addition, there is one Ordinary Watercourse (watercourses that are not designated as a Main River), Burstow Stream Tributary (south/upstream of the M23 Spur), and land drainage ditches within the Project boundary

4.1.3 Additionally, numerous watercourses and land drainage ditches would receive road runoff from the Project once operational. Details of the existing and proposed drainage within the scheme footprint is available in the Surface Access Highways Surface Water Drainage Strategy (located in the **ES Appendix 11.9.6: Flood Risk Assessment Annex 2** (Doc Ref. 5.3)). Watercourses would also receive water discharge during the construction phase of the proposed scheme.

4.1.4 Detailed baseline surface water information is presented in **ES Chapter 11: Water Environment** (Doc Ref. 5.1) and associated appendices. **ES Figure 11.4.1** (Doc Ref. 5.2) presents the location of the surface water features.

5 Groundwater Context

5.1.1 Groundwater occurs in relatively thin, shallow superficial deposits of Alluvium and River Terrace Deposits (RTD) that underlie the proposed scheme in a number of discontinuous bands. These deposits are classified as a Secondary A aquifer.

5.1.2 Beneath the superficial deposits lies the Weald Clay Formation, classified as an unproductive aquifer. This is a thick sequence (confirmed to at least 35m in some areas of the proposed works) which generally acts as an aquiclude, thereby largely precluding the passage of groundwater.

5.1.3 The Tunbridge Wells Sands Formation is designated as a Secondary A aquifer and is found at depth below the Weald Clay confining layer. There is some sub-crop of this strata to the extreme south east of the site, although it is largely isolated from the surface by the mudstone of the overlying Weald Clay.

5.1.4 There are no consented discharges to groundwater, no SPZs for public water supplies within the groundwater study area, and no

5.1.5 drinking water safeguard zones.

5.1.6 The nearest licensed abstraction lies approximately 1km to the south of the proposed works and it is considered that this most likely abstracts from the Tunbridge Wells Sand Formation which is found at depth below the Weald Clay confining layer and is not considered to be at risk of impact from the proposed works.

5.1.7 Crawley Borough Council has been contacted to establish the presence of any registered, unlicensed abstractions, though at the time of writing, no response has been received. However, any impacts from the proposed works are considered to be localised and hence it is unlikely that there are private water supplies within the area likely to be impacted by proposed works.

5.1.8 Groundwater levels are generally present at shallow depth.

5.1.9 Detailed baseline groundwater information is presented in the baseline groundwater text in **ES Chapter 11: Water Environment**, and **ES Figure 11.6.7** (Doc Ref. 5.2) presents aquifer designations and groundwater levels.

6 Flood Risk Context

6.1.1 The **ES Appendix 11.9.6: Flood Risk Assessment** (Doc Ref. 5.3) assesses the risk of flooding to and from the proposed scheme from all sources including fluvial, surface water, groundwater and other flood sources such as sewer and water supply infrastructure.

6.1.2 Hydraulic modelling has been undertaken to inform the **ES Appendix 11.9.6: Flood Risk Assessment** (Doc Ref. 5.3) which includes a full description of the baseline and with-scheme fluvial flood risk.

6.1.3 The Environment Agency Risk of Flooding from Surface Water (RoFSW) mapping (Environment Agency, 2021) indicates that the proposed scheme is predominantly within an area at medium risk (between 1% (1 in 100) and 3.3% (1 in 30) Annual Exceedance Probability (AEP)) to low risk (between 0.1% (1 in 1,000) and 1% (1 in 100) AEP) of surface water flooding. However, there are areas designated as high risk (greater than 3.3% (1 in 30) AEP)

of surface water flooding at the locations where the proposed scheme crosses a watercourse.

6.1.4 The British Geological Survey (BGS) mapping identifies that there is susceptibility to groundwater flooding throughout the areas underlain by superficial deposits (i.e. superficial deposits flooding), with a moderate level of confidence. There is also identified susceptibility to groundwater flooding from the Tunbridge Wells Sand (clearwater flooding), but with a low level of confidence.

6.1.5 The **ES Appendix 11.9.6: Flood Risk Assessment** (Doc Ref. 5.3) includes a full description of the baseline groundwater flood risk.

7 Potential Impacts

7.1.1 The proposed scheme has the potential to cause temporary impacts to the water environment that would last for all, or part of, the construction phase. These impacts are reported in full **ES Chapter 11: Water Environment** (Doc Ref. 5.1).

7.2 Surface Water Quality

7.2.1 During construction, there are generally two sources of pollutants to the water environment: sediments and potentially polluting substances (e.g. cement and hydrocarbons).

7.2.2 The main sources of potential impacts to the surface water during construction could result from the following:

- Construction activities where there is an increased pollution risk from mobilised sediments in site runoff. These could reach watercourses directly via overland flow or the drainage network, to impact water quality. For example, during earthworks (i.e., regrading and construction of new embankments and cuttings),), soil stripping, vegetation clearance, the movement of heavy machinery/vehicles and runoff from stockpiles. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates. The likelihood of silt being generated from construction activities would be greater after rainfall events.
- Temporary construction drainage would be used to ensure the collection of rainfall runoff from construction areas, compounds and haul roads. Groundwater control activities such as dewatering may be required particularly for any cuttings or excavations. Discharge waters from construction drainage and dewatering activities have the potential to be contaminated with pollutants and may therefore result in contamination of a receiving water body.
- Deposition or accidental spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site runoff.
- The use of cementitious materials such as concrete has the potential to contaminate surface water and groundwater, including altering its pH (becoming more alkaline). This is most likely to occur if concrete is used below the water table.
- Works within or immediately adjacent to a watercourse, such as during the construction or modification of outfall structures and culverts, can lead to the disturbance or generation of fine sediment, creation of areas of localised scour or have a higher risk of pollution given the proximity of the works to flowing water. There is also the risk of materials, equipment and chemicals falling into the watercourse.
- Works close to existing gullies or drains forming part of the existing highways drainage network may also create preferential pathways, through the drainage network, for pollutants to reach watercourses.
- Areas that are at risk of flooding may also present a greater risk of water pollution should a large fluvial flood event occur during the construction period.

7.3 Water Resource

7.3.1 During construction, surface water may need to be abstracted for construction purposes. If not disapplied and where required, an abstraction licence from the Environment Agency would be sought. The location, timing, duration and quantities of water required are not known at this stage.

7.3.2 Water would be pumped into attenuation ponds when required and water bowsers would use them as a water source when dust suppression is required. The management requirements of the use of water from these ponds will be detailed during further design stages. If it is determined by the Environment Agency or Lead Local Flood Authority (LLFA) that alternative supplies such as connections to mains are needed, these will be considered.

7.3.3 Anthropogenic climate change has the potential to increase the severity and frequency of water stressed conditions. In the absence of sufficient risk mitigation measures, such conditions can lead to drought.

7.4 Hydromorphology

7.4.1 Potential impacts on hydromorphology during construction could result from the following:

- Bank top loading and ground vibration due to piling adjacent to or on the banks of a watercourse could lead to destabilisation of the bed and banks of the channel. If required, works would be undertaken under and in accordance with environmental permitting requirements to address and mitigate impacts associated with in-channel and bankside works.
- Temporary working areas for culverts, outfalls and piling on or near to river banks could potentially cause localised bed and bank scour. The inclusion of new or widened bridges, outfalls and drain confluences could also change sediment and/or flow dynamics locally to create areas of localised scour.
- Vegetation removal, and excavation and earthworks on or near the river banks have the potential to result in localised destabilisation and erosion of the bed and banks of the watercourse, which can impact the quantity and dynamics of flow and sediment supply.
- Ground lowering on the floodplain for flood compensation areas would have the effect of increased sediment loading on the watercourses during construction, whereby there is the potential for the release of fine sediments into the watercourses. There is also the potential for sediment pollution runoff from construction areas into watercourses where hydrological pathways are present.

7.4.2 If required, works would be undertaken under and in accordance with Environmental Permitting Requirements to address and mitigate impacts associated with in-channel and bankside works.

7.5 Groundwater

7.5.1 Dewatering during construction works is likely to locally lower groundwater levels and promote groundwater flow laterally and vertically towards the works. These can in turn impact on groundwater receptors such as the following identified within the radius of influence of the proposed works (see **ES Appendix 11.9.5: Groundwater Assessment** (Doc Ref. 5.3) for details):

- High-sensitivity surface water receptors (Crawter's Brook, Gatwick Stream, River Mole) potentially resulting in temporary reduction of baseflow contribution to a watercourse.

- Mobilising groundwater from areas with pre-existing poor groundwater quality towards the work sites. This would apply for example to any areas with known contamination, such as petrol stations, and may pose contamination risk to discharge to nearby surface water.
- Reductions in groundwater levels inducing settlement in cohesive geological units. This would potentially lead to impacts on property, heritage assets and infrastructure such as runways, railways, highways, and local bridges.

7.5.2 Discharge of groundwater from dewatering activities is likely to be required to surface water bodies or back to groundwater through a groundwater recharge arrangement. This can impact groundwater levels, flow and quality in the vicinity of the recharge area, especially if recharging to a different groundwater body or area than abstracted from.

7.5.3 Piling is required for temporary works such as for the widening of existing bridges associated with the Highways improvement works and for permanent works such as building structures and foundation works (eg Pier 7 foundation works and new hangar).

7.5.4 Piling has the potential to create temporary pathways for poor quality perched groundwater to migrate to aquifer units or confined deeper horizons. Piling techniques can also introduce sediments or contaminated soils to an aquifer body as material is pushed down by the piling technique.

7.5.5 Any potential impacts from piling are likely to be limited to shallow groundwater within Secondary aquifers, where present, or shallow groundwater confined to water-bearing units in unproductive strata. It is assumed that no piling would extend into the Tunbridge Wells Sands aquifer at depth below the Weald Clay.

7.5.6 The works also have the potential to impact on groundwater quality from accidental spillage or releases during construction activities by the following paths:

- There is a risk of accidental spills and releases of fuels, lubricants, cementitious and other harmful substances used or stored during construction particularly at construction compounds and laydown areas. These can impact groundwater by migration through permeable shallow soils, washdown and runoff to permeable areas, leakage of site drainage or preferential migration through boreholes and monitoring wells. Larger releases or spills may migrate within groundwater to nearby groundwater receptors such as surface water bodies.
- The use of cementitious materials such as wet concrete has the potential to contaminate groundwater, including altering its pH (becoming more alkaline). This is most likely to occur if wet concrete is used below the water table. Wash-out water from wet concrete batching plants also has the potential to impact on groundwater quality if discharged to ground.

7.5.7 There is a risk of physical contamination of groundwater from activities such as construction of attenuation ponds and foundations. This disturbance has the potential for mobilisation of contamination or turbidity impacts on aquifers reaching groundwater-dependent features.

7.5.8 Temporary drainage would be used to ensure the collection of rainfall runoff from construction areas, compounds and haul roads. This has the potential to reduce the amount of rainfall recharging the superficial aquifers. Discharge to ground from temporary construction drainage may be required. This has the potential to be contaminated with pollutants and, should the drainage discharge to groundwater, this would provide a pathway for pollutants.

7.6 Flood Risk

7.6.1 Potential flood risk impacts during construction could result from the following:

- Construction works (including stockpiled materials or watercourse crossings) on fluvial, overland and groundwater flow paths, fluvial floodplain, or any in-channel works could lead to flow being impeded, flow paths altered, or a loss of floodplain volume and a potential increase in flood risk or a disruption of works sites.
- Alterations to culverts and other structures conveying water could also result in a temporary loss of capacity or require watercourses to be temporarily diverted.
- Sediment, construction materials and equipment stored in the floodplain or on flow paths could be washed downstream where it could block watercourse channels, land drains and sewers, and increase the risk of flooding.
- Construction drainage and dewatering of below-ground construction elements discharging to watercourses or to ground could increase the rate and volume of runoff and increase the risk of blockages in watercourses that could lead to flow being impeded, and potentially increase flood risk.
- Construction works could cause an increase in the rate and volume of surface water runoff by increasing impermeable areas or by reducing permeability by compacting soils.
- Excavations could potentially damage existing wastewater or water supply infrastructure and lead to flooding.
- Construction works could alter groundwater flow paths and levels and increase the risk of flooding.
- Watercourse channels may have to be temporarily diverted or constricted to facilitate works (e.g. proposed works to existing watercourse crossing structures). Subject to appropriate permits, methods such as temporarily overpumping of watercourses or use of sheet piling (or other water-retaining structures) would be employed to manage flows in the channel. This could temporarily reduce the capacity of the channel and increase flood risk.
- Construction within the floodplain and other areas potentially at risk off flooding could present a risk to construction personnel and machinery.
- An acceleration in anthropogenic climate change over the duration of the construction periods has the potential to exacerbate many of the flood risks outlined above, through an increase in both the incidence and magnitude of extreme flooding events.

8 Permit, licence and consent requirements

8.1.1 The **Statement of Other Consents and Licences** (Doc Ref 7.1) identifies ‘ other consents and licences’ that are required to allow the construction and operation of the Project.

8.1.2 For Main Rivers the Environment Agency has permissive powers to undertake works, for example for maintenance. For Ordinary Watercourses those powers fall to the East Sussex and Surrey County Councils who are statutory consultees for the Project as LLFAs. The proposed works within the floodplain (Flood Zone 3) or in, under, over or within 8m of Main Rivers would require a Flood Risk Activity Permit from the Environment Agency. An Ordinary Watercourse Consent would be required from the Lead Local Flood Authority for works that would change the flow of Ordinary Watercourses (e.g. construction works that affect it, structures placed within the watercourse, additional flows to the watercourse etc)

8.2 Flood Risk Activity Permit

8.2.1 The proposed works within the floodplain (Flood Zone 3) or in, under, over or within 8m of Main Rivers would require a Flood Risk Activity Permit from the Environment Agency. An Ordinary Watercourse Consent from the LLFA would be required for works which would affect the flow of water or cross-sectional area of an Ordinary Watercourse. Flood Risk Activity Permits and Ordinary Watercourse Consents would be required for temporary works and potentially permanent works.

8.3 Water discharge

8.3.1 Where required a permit would be obtained for the discharge to Main Rivers or ground of any 'contaminated' construction site runoff or groundwater from dewatering. An Ordinary Watercourse Consent would be required from the LLFA for discharge to an Ordinary Watercourse.

8.3.2 Water discharges may also include discharges from a self-contained Package Treatment Plant which would treat foul water effluent prior to discharging treated foul water via the compound drainage.

8.3.3 The relevant regulator would be consulted by the PC to obtain the necessary licences. The PC in consultation with the relevant regulator would determine acceptable suspended sediment limits and what pre-treatment may be required, in addition to the volume, rate and duration of flows that can be discharged to watercourses without resulting in significant flood risk or environmental effects, and any constraints on the discharge (e.g. no discharge when flows in the receiving watercourse exceed a certain level at a certain location etc.).

8.3.4 All discharge peak flows to watercourses would be carefully controlled (as discharging water at high velocities into a watercourse can cause disturbance and erosion of the banks or bed) in accordance with the requirements of the relevant regulator. The exit velocity at the outfall(s) would be reduced, where required, using baffles or similar systems, and the outfall(s) aligned downstream by 45°, ensuring they would not protrude into the channel. Discharges to an ordinary watercourse should not exceed the equivalent pre-development greenfield runoff rate to avoid increasing flood risk downstream.

8.3.5 Discharge of water from dewatering (such as from excavations during construction of foundations, basement and other sub-surface structures) may be to groundwater through groundwater recharge arrangements to manage groundwater levels. The suitability of this method would be investigated through detailed design of the proposed scheme and further investigations and impact assessments would be required as part of the permitting process with the Environment Agency to confirm rates of abstraction, discharge, flood risk, areas of influence and identify potential receptors within the area of influence.

8.4 Watercourse diversion

8.4.1 The temporary diversion of Main Rivers could require a transfer licence from the Environment Agency. This is to be confirmed by the PC prior to construction. The temporary diversion of an Ordinary Watercourse would require ordinary watercourse consent from the LLFA.

8.5 Water resources

8.5.1 A permit would be obtained for surface water abstractions during construction. The location, timing, duration and quantities of water required are not known at this stage.

8.6 Groundwater abstraction

8.6.1 Where groundwater control is required, isolation techniques would be considered in preference to dewatering, if feasible, to limit impacts to stream baseflow and subsequently downstream designated sites. Specific discharge locations for flows from dewatering activities have not yet been established. Generally, discharge of such flows would be to the closest drainage ditch/watercourse.

8.6.2 During construction any significant dewatering, principally from excavations considered likely to intercept groundwater, would be subject to an abstraction licence issued by the Environment Agency, which should be planned during pre-construction activities.

8.6.3 Detailed site-specific dewatering assessments would be developed for construction excavations as required to inform the detailed design, temporary works and subsequent permit applications. The dewatering assessments would confirm rates of abstraction and area of influence and identify potential receptors within the area of influence.

8.7 Piling risk assessment

8.7.1 Where contaminant land or groundwater issues have been identified, a piling risk assessment is required prior to the relevant piling being undertaken to ensure that the proposed piling method would not have any adverse impact by creating new pathways for the migration of potential contamination, primarily in relation to the protection of water resources.

9 Monitoring

9.1 Surface water quality and resources

9.1.1 As best practice, surface water quality would be monitored throughout the construction phase of the proposed scheme. Monitoring would be designed to demonstrate compliance with any environmental permits and/or abstraction licences in place. It would also contribute to ensuring that mitigation measures are operating as planned, identifying any detrimental effects on the water environment and to allow any pollution incidents to be identified and remedied.

9.1.2 The scope of monitoring would be defined during the detailed design phase of the proposed scheme and a Water Quality Monitoring Plan (WQMP) would be prepared prior to construction by the PC as part of compliance with the environmental permitting regime.

9.1.3 During construction it is anticipated that as a minimum water quality monitoring would consist of regular site visits, to make visual observations.

9.1.4 Water bodies to be monitored and the scope of monitoring would be based on risk assessment but would include all watercourses (and possibly some ponds) that may be adversely impacted during the construction works. This would include watercourses that may be affected by new structures, that are diverted/realigned/rerouted, close to the works, or potentially affected by dewatering of deep excavations. Monitoring may be undertaken on a catchment or sub-catchment basis, providing sufficient data can be collected.

9.1.5 Where water is to be discharged to watercourses, constraints on the discharge rate, pre-treatment and the scope of the quality and level of monitoring required would be agreed in advance with the relevant regulator. It is expected that baseline monitoring would be required by consenting authorities for a period in advance of the works which would be agreed with the consenting authorities.

9.1.6 Water monitoring for discharge to controlled water would be designed to demonstrate compliance with any environmental permits and/or abstraction licences in place. It would also contribute to identifying any detrimental effects on the water

environment and to allow any pollution incidents to be identified and remediated.

9.1.7 The Environmental Manager would be responsible for undertaking any investigations required as a consequence of the programme of construction water quality monitoring.

9.2 Hydromorphology

9.2.1 Monitoring would be required on the River Mole where significant effects could take place, particularly at the renaturalised River Mole channel, the Museum Field FCA spillway and Car Park X outfall, and any other areas identified where there is change to the channel bed and banks.

9.2.2 Monitoring would involve observations of the channel to determine whether bank or bed protection is required. This would be achieved through taking photographs of the affected areas prior to construction and comparing them during and upon completion of construction. Development of an adaptive management process is to occur during later design stages.

9.2.3 The monitoring programme developed should have a resolution and timing appropriate to the impacts being monitored. It is recommended that the monitoring is carried out over a period of between 3 to 5 years following the completion of construction, and data are collected at intervals of 3 to 6 months, and post-flood events. This should be planned during the pre-construction period and included in contracts.

9.2.4 The monitoring would ideally be undertaken in May/June and September. This would ensure vegetation is visible but not so well developed that it obscures observations or hinders access. Adaptive management would take place if monitoring concludes that bank protection is required.

9.3 Groundwater

9.3.1 Additional ground investigation information would be used to inform the detailed design phase (including detailed drainage development), environmental permitting requirements and to refine the assessments associated with dewatering, settlement, drainage, gas main diversion, sheet piles and flood compensation storage areas.

9.3.2 Groundwater monitoring would be undertaken as part of the additional ground investigations to support characterisation of groundwater at the site.

9.3.3 No additional groundwater monitoring is required during the construction phase.

9.4 Flood risk

9.4.1 No monitoring required during the construction phase.

9.4.2 Flood warnings from the Environment Agency and weather warnings from the Met Office would be monitored by the PC to forewarn of adverse weather conditions to take pre-emptive action.

10 Control measures during construction

10.1.1 All construction works for the proposed scheme would be undertaken in accordance with best practice techniques to reduce the risk of pollution of water bodies (directly or indirectly), to reduce the risk of flooding and protect and preserve the hydromorphological and ecological elements of watercourses. This would be delivered through the **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref. 5.3) and its associated management plans.

10.1.2 Construction Dust Management Plans would be developed for approval by the relevant local authority as described in the **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref. 5.3). These would set out measures to control dust from construction activities. These measures are relevant in that they can require the use of water and could lead to the formation of construction site runoff containing high levels of fine sediments.

10.1.3 Construction Industry Research and Information Association (CIRIA) guidance would be adopted as standard mitigation as appropriate, including from the following publications:

- Environmental Handbook for Building and Civil Engineering Projects (3 Parts: C512, C528 and C529) (CIRIA, 2000a-c)
- Control of water pollution from construction sites. Guidance for consultants and contractors (C532) (CIRIA, 2001)
- Control of water pollution from linear construction projects. Technical guidance (C648) (CIRIA, 2006a) and site guide (C649) (CIRIA, 2006b)
- Groundwater control: design and practice, second edition (C750) (CIRIA, 2016)
- Environmental good practice onsite guide (fourth edition) (C741) (CIRIA, 2015)

10.1.4 Working practices would be aligned with the Environment Agency guidance, Protect Groundwater and Prevent Groundwater Pollution (Environment Agency, 2017).

10.2 General mitigation measures

10.2.1 Mitigation measures can be considered as source control (i.e. to prevent fine sediment-laden runoff forming and to treat contaminated runoff close to where it forms), barriers and conveyance measures (i.e. to prevent site runoff draining uncontrolled into water bodies and to direct and treat it en-route to storage areas), and storage and final treatment areas (i.e. where water is stored onsite and treated to the required quality prior to it being discharged from the site).

10.2.2 In any construction site temporary drainage system and where treatment is required, it is typical for a combination of treatment systems or proprietary measures (i.e. engineered device for treatment such as a lamella clarifier) to be used. Measures are often used in series to make maximum use of available space and to ensure adequate removal of fine sediment prior to any discharge being made from the site (for example runoff may be initially stored in small storage areas before being pumped via settlement tanks or lamella clarifiers to final treatment storage areas).

10.2.3 Temporary site drainage would be planned to manage the risks associated with heavy rainfall or flood events appropriate to the risk during construction such as the topography, catchment size and duration of the works. Where temporary drainage is required, it would be sized to provide an appropriate standard of flood protection, with a 10% (1 in 10) AEP event standard. This would be identified within the WMP prior to commencement of applicable works in that catchment, for example earthworks. The specific treatment would be determined by the PC with reference to good practice Technical Guidance C648 Control of Water Pollution from Linear Construction Projects (CIRIA, 2006a) and would be adapted throughout the works depending on the need and circumstances at any given time. Measures that may be used include:

- Drainage ditches with check dams and/or sediment traps. Ditches would be excavated in appropriate locations to reduce the likelihood of any surface water collecting in compounds, material storage or works areas.
- Pre-earthworks drainage would be sized appropriately to intercept and accommodate all shallow groundwater flows entering the works area to protect flood sensitive receptors.

- Outfalls from temporary site drainage would be to local surface water bodies and would maintain existing catchment boundaries wherever practicable.
- Sediment barriers such as silt fences, straw bales and earth bunds (used and positioned in appropriate locations).
- Temporary storage areas (for example settlement ponds, tanks and skips in series).
- Proprietary treatment measures (for example lamella clarifiers).
- Baffle pads or other measures to dissipate flow energy on any temporary outfalls to water bodies.

10.3 Construction site establishment and general earthworks

10.3.1 During the initial preparation works prior to the start of construction, temporary measures to control runoff draining from the construction site would be implemented, and then managed and adapted by the PC accordingly as the works progress.

10.3.2 Information to support the necessary environmental permitting required to undertake the works would be developed by the PC during the detailed design phase and, as appropriate, the Environment Agency and/or the LLFA would be consulted prior to works commencing in that particular works area. Site specific method statement(s) (or similar) for temporary site drainage would be included during the detailed design phase. Temporary site drainage would be consistent with the objectives and treatment requirements of this plan, and the intended outcomes. The following principles for water management are expected to be used to manage surface water:

- Preconstruction drainage would be installed to intercept the existing land drainage system and divert water away from the working area where practicable.
- Where practicable, permanent works attenuation ponds would be constructed early in the programme. It is proposed to make use of the permanent works attenuation ponds for settlement of construction discharge water; however, some additional temporary attenuation ponds may be required in certain areas.
- Drainage installation would commence at the furthest point on the system and work back so that construction drainage is discharged through the new system.
- Site runoff water, for example from earthworks excavation, would be diverted through filtration/attenuation areas for treatment, where required, prior to discharge.
- Where practicable, vehicle traffic would be limited to haul roads across the site to prevent soil compaction and associated increase in surface water runoff.
- Sustainable Drainage Systems (SuDS) would be used where practicable to ensure no increase in runoff rates or volumes from the construction sites and compound areas (for example compound car park) to surrounding land drainage ditches and to manage surface water flood risk. Subject to consent, the SuDS would discharge to the local watercourses, ditches or to ground within the site boundaries.

10.3.3 Runoff from the construction site would not be allowed into any natural pond. Construction runoff would be discharged into a watercourse under a permit from the relevant authority (where required) and following treatment and attenuation where required.

10.3.4 This would ensure that any sediment (including any adsorbed pollutants) carried in suspension in the surface water runoff from the site would have settled out before it can be discharged to receiving watercourses under an environmental permit from the Environment Agency or Watercourse Consent from the LLFA.

10.4 Timing of works and programming

10.4.1 The timing of certain works or the programming of specific tasks on ‘day-to-day’, ‘week-to-week’ and ‘month-to-month’ basis can be important to reduce flood risk and the risk of water pollution occurring during the construction period. It is recognised that many factors affect the programme and avoidance of the wetter months of the year or periods of wet weather is impractical. However, where this can be done the PC should look for opportunities to reduce the water pollution risk. It is recommended that the following principles are adopted:

- Proposed drainage should be constructed prior to works where practicable, to ensure no increase to surface water flood risk that could occur as a result of construction works causing an increase in the rate and volume of surface water runoff from an increase in impermeable areas or by reducing permeability by compacting soils.
- Construction work would be phased such that any required flood mitigation areas would be constructed prior to any encroachment into the floodplain caused by the proposed scheme, with the exception of the temporary River Mole crossing that would facilitate access to construct the Museum Field FCA. Further detail is available in the **ES Appendix 11.9.6: Flood Risk Assessment** (Doc Ref. 5.3). A flood compensation delivery plan will set out the delivery programme for the flood compensation areas.
- Earth moving works and excavations should, where practicable, be undertaken during the drier months of the year (typically early spring to early autumn).
- When undertaking earth moving works, periods of very wet or prolonged wet weather would be avoided, if practicable, to minimise the risk of generating runoff contaminated with fine particulates. Where this is unavoidable, the adequacy of standard mitigation measures to control fine sediment laden runoff should be continuously reviewed.
- Areas of vegetation clearance and top-soil strip should be limited as much as practicable and implemented in accordance with the following Future Management Plans: Vegetation Retention Plans and Soil Management Plans as referred to in Section 2.2 of the **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref. 5.3). Where practical, vegetation clearance across the proposed scheme would be phased to minimise the areas of exposed ground and reduce the potential risk for runoff. Disturbed areas would be stabilised as soon as possible after construction by seeding with grass, using geotextile covers or other suitable means.
- Construction of culverts and realignments would be timed during low flow conditions where practicable, to reduce the impact on flow dynamics and sediment transport.
- Flow should ideally only be allowed back along diverted channels once banks have been stabilised by vegetation, which typically takes approximately 12 months. Where this is not possible, the design of the new channel and new geomorphic features may need to be protected, for example by the use of coir matting/rolls, where deemed necessary by the design and what stabilisation period there is. Where required, regular inspections of the post-diversion works would be carried out. Protection measures are needed where there is a risk of excessive sediment erosion/mobilisation.

10.5 Measures to intercept and treat suspended fine sediments

10.5.1 Mitigation measures relevant to controlling surface runoff, focusing on those areas where there would be exposed soils, excavations, storage of topsoil and other aggregate materials, are summarised below.

10.5.2 In practice, the application of these measures would be a continuously adaptive process in response to site specific

constraints and changing needs onsite. For example, different types and levels of treatment of fine sediment in runoff may occur depending on the time of year, the location of the works, and the nature of works being undertaken at that point in time. It is therefore not appropriate to be entirely descriptive at this stage, but to focus on the range of measures that the PC can deploy to provide the necessary water environment protection.

10.5.3 Constructing the River Mole renaturalised channel offline and leave to vegetate over before flow is initiated down the channel. This would reduce the release of fine sediment and the likelihood of any unexpected large-scale channel change.

10.5.4 Measures to intercept and treat suspended fine sediments may include:

- Where practicable, scheduling construction activities to minimise the area and period of time that soils would be exposed, particularly during the wetter months (i.e. autumn to early spring) or periods of forecast heavy or prolonged rain.
- Installation of drains/ditches around the working areas to intercept surface runoff and divert it around the working areas.
- Installation of diversion drains where necessary to channel water to a desired location.
- Existing land drains are to be identified and covered or protected. During heavy rain land drains may transport silt pollution from the site into local watercourses. Where land drains are truncated by the construction works they would be intercepted either by the permanent drainage design or the flows would be temporarily incorporated into the temporary drainage system which would take the water through a treatment point prior to discharge.
- Minimising the stockpiling of materials and, where practical, stockpiles are to be located away from any existing watercourse, ponds, boreholes and site drainage, preferably on flat lying land. Where this is not practicable due to space constraints, onsite additional mitigation measures (such as bunds) would be implemented to provide an adequate barrier between the potential source of contaminated runoff and the receptor. The stockpiling of materials would take predicted overland flood flow paths into account so as not to introduce an obstruction. This would be addressed in the future Soil Management Plan listed in the **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref. 5.3).
- Movement of construction vehicles and plant would be controlled to minimise the potential for soil compaction and erosion.
- For surface water quality, water would be discharged following settlement to remove suspended solids. Appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff would be provided. The PC would monitor the build-up of fine sediment in temporary construction drainage systems and ensure they remain effective by either removing sediment or providing replacement measures. Where the permanent attenuation ponds are used during construction for drainage and treatment, any sediment accumulated shall be removed prior to the end of the construction period so as to maintain the capacity of the ponds for attenuation and water quality treatment purposes during operation.
- Tools and heavy plant to be washed down and cleaned in designated areas onsite only. At all wash down locations, the wash down water would be collected for treatment before discharge to surface water drainage under appropriate permit/consent and/or agreement with the sewerage company, or otherwise removed from site for appropriate disposal at a licenced waste facility.
- Debris and other material from the works would be prevented from entering surface water drainage or falling into the channel from height, through maintenance of a clean and tidy site, provision of clearly labelled waste receptacles, grid covers, the presence of site security fencing and debris netting beneath structures where required and necessary.
- Biosecurity measures would be required to ensure that no invasive species are brought onto site. Measures would include checks of plant/vehicles and footwear to ensure clean and clear of potential contaminants with best practice implemented as necessary. Refer to **ES Appendix 8.8.1: Outline Landscape and Ecology Management Plan** (Doc Ref 5.3) for further details.
- The rate of discharge to any watercourse of construction site runoff would be no greater than a controlled rate agreed in advance with the relevant regulatory authority and appropriate measures would be taken to dissipate the flow energy at the temporary outfall to prevent erosion of the bed and banks of the receiving water body (for example correct orientation of the outfall and the use of baffle pads).
- Existing road or track crossings of watercourses should be used where practicable. Where temporary crossings of the watercourses are required, plant would not track along the channel without adequate protection being installed prior to works, and temporary open-span crossings should be used as far as reasonably practicable.
- If needing to create a dry working area in the channel, the use of sand bags would be avoided if possible to avoid them breaking open and polluting the channel.
- All access roads or purpose-built haul roads would be kept free of mud by the use of a road sweeper, and if deemed required by the PC, a vehicle wheel wash facility on the main accesses to the site.

10.6 Protection of the Riparian Zone

10.6.1 Works are to be undertaken in accordance with relevant guidelines, riparian planting could be used as buffer strips to reduce diffuse pollution

- Limit journeys with plant on ground to avoid tracking repetitively on softer verges;
- provision of matting; and
- utilisation of pollution prevention guidelines.
- Avoid spawning periods for working in the river
- installation of cofferdam for in-channel works minimise length to be culverted
- undertake fish rescue survey prior to in-channel works to safeguard fish populations
- construction sequencing which allows for planting and establishment of riparian and aquatic plant species at renaturalised channel
- renaturalised diversion channel brought online prior to infilling old channel to maintain fish passage through River Mole
- offline construction of the diversion renaturalised channel
- re-seeding of banks during spring to allow stabilisation of banks

10.7 Flood risk

10.7.1 An incident response plan would be prepared prior to construction. This would be present on site throughout construction, informing all site workers of required actions in the event of a flooding incident.

10.7.2 Activities within areas at risk of flooding would be managed (i.e. kept to a minimum and/or timed for periods of lowest risk of flooding).

10.7.3 Where necessary, implementation of temporary mitigation measures would prevent an increase in flood risk as a result of

flood waters displaced during temporary construction works (for example due to raised storage areas, haul roads and cabins).

10.7.4 Where practicable, site layout would ensure material stockpiles and storage areas would be located away from adjacent watercourses, ponds, boreholes, site drainage, nor within Flood Zone 3 and take predicted overland flood flow paths into account so as not to introduce an obstruction. Where this cannot be achieved, stockpiles would be limited such that they can be moved upon receipt of any flood warning/adverse weather conditions, or onsite additional mitigation measures (such as bunds) would be implemented to provide an adequate barrier between the potential source of contaminated runoff and the receptor.

10.7.5 Where public right of way (PRoW) routes would be temporarily realigned through areas susceptible to flood risk, public safety risk assessments would be completed and appropriate mitigation (such as signage) would be identified and included within the proposed scheme.

10.7.6 Where river realignment is proposed, construction activities should be planned to ensure no increase in fluvial flood risk, with temporary mitigation provided if required.

10.7.7 To manage the risk from groundwater flooding (during excavation) through appropriate working practices and with adequate plans and equipment in place for dewatering to ensure safe dry working environments. Where dewatering discharge to watercourses is proposed, discharge rates would be controlled to achieve no environmentally significant change to flood risk associated with the receiving watercourses as a result of dewatering discharges. If required, dewatering discharge would be temporarily paused during flood events to prevent any increased flood risk during the flood event.

10.7.8 Typically, any temporary works would be designed as to not create temporary build-up of groundwater levels leading to groundwater flooding. Where required, temporary works would be designed so that they could be removed. Any temporary supports such as sheet piles that cannot be removed would be left in situ. These would be assessed to ensure that they do not lead to the long-term build-up of groundwater leading to potential flooding risks.

10.7.9 Where overpumping of watercourses would be utilised during construction (e.g. to enable works within watercourse channels), overpumping pipes would be sized appropriately for the watercourse flows in agreement with regulators.

10.7.10 Where watercourse crossings would be required during construction, a 10% (1 in 10) AEP event standard is proposed to be used to size these crossing structures. As part of the relevant Flood Risk Activity Permit or Watercourse Consent application, the flood event appropriate for each watercourse would be consulted with the Environment Agency (for Main Rivers) or the LLFA (for Ordinary Watercourses) respectively. This would ensure a low risk of the works causing an increase in flooding to receptors, particularly as the risk of an event occurring during the short construction timescales would be low.

10.7.11 The Environment Agency's Flood Warning Service would be adopted by the PC during construction and a suitable flood risk action plan developed. This would plan for the effective and safe evacuation of personnel (and plant, if safe to do so) from areas at risk on receipt of a flood warning. Areas of the River Mole, Gatwick Stream and Burstow Stream are within Environment Agency flood warning areas. Additionally Gatwick receives its own bespoke flood warning notifications from the Environment Agency.

10.7.12 An array of potential adaptation options exist that could be adopted to mitigate climate change exacerbated flood risk. In conjunction with those measures outlined above, this includes avoidance of temporary buildings and other construction spaces being located in high flood risk zones; temporary flood protection or floodwater diversion measures (e.g., mobile floodwater pumps; drainage channels and ponds; alternative site access routes; ground cover storm protection measures and materials); avoidance of operation-critical building systems (e.g., communications and IT services) being located on the ground floor or below projected flood levels; and the installation of automatic switch-off features for electrical equipment which become triggered in the case of flood events.

10.8 Water stress

10.8.1 The risk of climate change induced heatwave related drought can be mitigated through multiple water management measures. Rainwater harvesting systems could be installed to capture and store rainwater for times of water stress (e.g., groundwater collection trays) for human water use; the water use of green spaces and nature more generally; and the water demands of built infrastructure (e.g., using water to spray runways, roads, or buildings). Moreover, the use of low water use and water efficiency appliances could further mitigate the risk of water stress.

10.9 Agricultural land drainage

10.9.1 Details of the existing and proposed drainage within the scheme footprint is available in the Surface Access Highways Surface Water Drainage Strategy located in the **ES Appendix 11.9.6: Flood Risk Assessment Annex 2** (Doc Ref. 5.3).

10.9.2 Particular care would be taken to ensure that the existing land drainage system is not compromised as a result of construction of the proposed scheme. Where practicable, land drainage systems within the Order Limits would be maintained during construction and if required, reinstated on completion of the proposed scheme.

10.9.3 The Agricultural Liaison Officer (ALO) will coordinate drainage surveys to understand the existing land drainage and any related farm drainage that may be affected by the proposed scheme. This will include review of as-built information supplied by landowners or occupiers (as applicable) and some trial trenching works. Based on this understanding of the land drainage, the PC would assess any additional need for surveys during the detailed design phase of the proposed scheme.

10.9.4 Existing agricultural land drains, where encountered during the construction of the proposed scheme, would be appropriately marked. The location of drains cut or disturbed by the construction works would be photographed, given a unique number and geo-referenced. The actual condition and characteristics (e.g. depth of installation, pipe type and diameter) of the existing drainage would also be recorded upon excavation.

10.9.5 During the construction works, temporary drainage or the proposed scheme permanent drainage would be installed to intercept existing field drains and ditches to maintain the integrity of the existing field-drainage system during construction. Such measures would also assist in reducing the potential for wet areas to form during the works, thereby reducing the impact on soil structure and fertility.

10.9.6 Any field drainage intercepted during construction would either be reinstated following reinstatement of the land or diverted to a secondary channel. Landowners and occupiers would be informed of the design of drainage works required during construction, including: pipe layout, falls, dimensions and outfalls (if required). The drainage would be reinstated in a condition that is at least as effective as the previous condition (as identified in the relevant condition and/or drainage survey) and would follow

best practice for field drainage installations taking into account site-specific conditions.

10.9.7 The reinstatement of land drainage would only be undertaken within the order limits for the proposed scheme.

10.9.8 Records of existing and remedial drainage would be maintained by the PC with copies provided to the landowner or occupier (if applicable) following the completion of construction works in each location. Furthermore, landowners and occupiers would be provided with the opportunity to inspect land drainage works as they progress, subject to health and safety considerations.

10.10 Management of dewatering activities

10.10.1 In order to minimise the impact of the dewatering on groundwater and surface water resources, a scheme of groundwater control would be implemented to ensure water levels in adjacent water bodies are maintained and any discharge is of a suitable quality. This would involve a programme of water monitoring and controlled discharges.

10.10.2 Dewatering activities for the proposed works are not anticipated to be significant. However, where required, works would be implemented in accordance with a construction dewatering strategy which would be developed by the PC in accordance with the Groundwater Assessment presented in **ES Appendix 11.9.5: Groundwater Assessment** (Doc Ref. 5.3).

10.10.3 A detailed differential settlement risk assessment based on the detailed design and supplementary ground investigation would be undertaken to assess the potential for differential settlement to all buildings/structures identified in **ES Appendix 11.9.5: Groundwater Assessment** (Doc Ref 5.3). Following supplementary ground investigation and updated dewatering assessment the predicted drawdowns at buildings will be determined and settlement risks assessed. Where required, detailed settlement risk assessment would be undertaken at locations where risks of differential settlement are identified. Should the detailed risk assessment(s) identify buildings at risk of differential settlement, a condition survey would be undertaken for any such building(s) prior to the relevant works commencing. Asset protection measures as specified in the condition survey would be implemented, subject to landowner consent (where required), prior to relevant works commencing.

10.10.4 Where dewatering is required in construction excavations, the water would be discharged following settlement to remove suspended solids; the rate, volume and duration of any discharge would be agreed with the regulating authority.

10.10.5 It would be ensured that the drainage system has adequate capacity to store any additional surface water runoff or groundwater required to be pumped out of excavations.

10.10.6 Any contaminated groundwater intercepted during construction which cannot be treated to achieve consented discharge parameters would be tanked and disposed of offsite at an appropriate licensed location.

10.11 Existing sewer and water supply infrastructure

10.11.1 Plans of existing services (including existing sewer and water supply infrastructure) would be used to identify services close to any required construction works. Where necessary, existing services would be highlighted as a risk on design drawings to ensure awareness of these services and reduce the risk of service strike during construction.

10.12 Measures to control the storage, handling, spillages and disposal of potentially polluting substances

10.12.1 Mitigation measures to control the storage, handling, spillages and disposal of potentially polluting substances should include as a minimum:

- Plant and machinery would be inspected before use to ensure they are clean and fit for operation onsite.
- All static plant or mobile plant parked for prolonged periods would be fitted with ‘plant nappies’ or drip trays, which would be checked regularly (i.e. prior to first use following the prolonged period) and emptied if required by the PC into the bunded waste oil containers.
- All mobile plant would carry spill kits where practicable, with other spill kits placed in sealed containers at key locations and at all works near to watercourses. Spill kits are to be checked regularly and replaced after use. For further detail on spill response refer to Section 3.10 of **ES Appendix 5.3.2: Code of Construction Practice** (Doc Ref. 5.3).
- All construction workers onsite, where identified through risk assessment are to be trained in the use of spill kits.
- All tanks containing fuel would be located in a secure and designated area on hardstanding, where practicable, away from surface drains and any watercourses. Fuel oil in mobile bowsers would be double skinned to 110% of their capacity. All bowsers would be fitted with automatic shut-off refuelling. Where movements occur of mobile fuel browsers, the refuelling valves and flaps should be shut down to prevent lapping liquids escaping.
- Refuelling of mobile plant to be undertaken in designated areas, for example construction compounds on an impermeable surface.
- Drilling fluids and additives (if used) would be stored appropriately in bunded tanks holding 110% of its capacity of the largest container or 25% of the total maximum stored volume (whichever is the greater volume). Any waste or used drilling fluid would be stored and then tankered offsite for appropriate disposal or disposed of by other suitable method that the PC may determine in accordance with legislation, any consents or permissions.
- Other liquid chemicals to be used onsite to be stored within a secure container in a designated area and clearly labelled.
- No equipment or materials other than those used for flow control (but excluding pumps and pipes) are to be left in the channel outside of working hours.
- Where practicable, precast concrete structures would be used to minimise the impact of wet cementitious materials on groundwater and surface water quality. Where this is not possible and wet concrete pours are to be made, care is to be taken when delivering the concrete to the site and during the operation. Formworks should be secure and fixed tightly to reduce egress of concrete. Measures to catch any spillage are to be provided and removed before water is allowed back into the working area.
- Implementation of site working practices to minimise the risk of concrete spillages. In particular, specific concrete wash out facilities are to be provided away from any watercourse, on flat land and operated to ensure no spillage of wet concrete to ground (for example by use of geotextiles, skips).
- The construction site and construction compounds should be kept secure at all times to prevent vandalism and anti-social behaviour that could lead to a pollution incident.

10.13 Fuel handling and COSHH materials

10.13.1 The PC would establish appropriate control and management measures for the storage, dispensing, containment and use of all fuels, oils and Control of Substances Hazardous to Health (COSHH) materials and wastes that would be required during construction of the proposed scheme.

10.13.2 The storage, dispensing, containment and use of fuels, oils and COSHH materials have the potential to cause significant damage

to the environment. Causes of environmental incidents linked to fuel, oil and COSHH materials on construction sites include:

- Delivery and use of materials
- Overfilling of storage containers
- Plant or equipment failure
- Containment failure
- Accidents and vandalism
- Mixing of inappropriate materials and wastes

10.13.3 Environmental incidents could affect:

- Drainage systems, surface waters, groundwater and soil
- Air quality, by producing fumes, vapours and airborne pollutants
- Land quality by contamination through spillages

10.13.4 The storage, dispensing, containment and use of all fuels, oils and COSHH materials and wastes would be undertaken in accordance with the Control of Substances Hazardous to Health Regulations 2002 and good practice guidance.

10.13.5 For COSHH materials and waste, relevant control and management measures may include:

- Storage would be in a secure, bunded and sheltered area
- Waste would be segregated
- COSHH liquids would not be stored in areas within Flood Zone 3
- Areas would be supervised, and records of materials and waste stored and removed from the area recorded
- The handling, storage and disposal would be undertaken as described in the COSHH Assessment and any Material Safety Data Sheet (MSDS)

10.13.6 Fuel and oil (including mould oil) would be stored in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001, with fuels and oil handled in such a way that risk of pollution is minimised. Specifically:

- Fuel and oil storage tanks would comply with The Control of Pollution (Oil Storage) (England) Regulations 2001 and would be locked outside working hours.
- Mobile bowsers would be bunded/double skinned and would comply with The Control of Pollution (Oil Storage) (England) Regulations and would be secured outside working hours.
- Storage areas would be located away from watercourses, ponds, boreholes, site drainage, or outside Flood Zone 3 wherever practicable. Where this is not possible due to space constraints onsite storage may be required within 10m, however in all cases fuel, oil and chemicals that have the potential to cause significant damage to the environment would be stored in a safe and secure bund or other container from which they cannot leak, spill or be open to vandalism.
- Any bunds would have a capacity of 110 per cent of the largest container or 25 per cent of the total maximum stored volume (whichever is the greater volume) and be constructed from impermeable materials. Where practical, these bunds would be covered to prevent the collection of rainwater. Individual drums in use would be stored on a drip tray sufficient to contain 25 per cent of the full capacity of the drum.
- Substances which have, either directly or indirectly, the potential to pollute water would be kept to the minimum required to undertake the work.
- All areas on sites where potentially polluting liquids and water-soluble materials are stored would be inspected on a regular basis.
- Storage tanks and drums would be maintained in a good condition, fitted with lids and labelled to indicate the contents.
- Bunds, tanks, pipework and plant would be regularly checked for signs of damage or leaks and would be regularly maintained.
- Fuel deliveries and refuelling of plant and equipment would be supervised.
- Refuelling would not be permitted within 10m of watercourses.
- Spill kits would be provided within close proximity to fuel and oil storage areas, with plant that is operating in isolated areas, and in welfare facilities. Drivers, operators and stores personnel would be trained in security and the use and safe disposal of spill kits.
- Static combustion engine plant (such as, compressors, lighting sets) would be integrally bunded or placed on plant nappies.

10.14 Working in and over watercourses

10.14.1 All works in the channel of watercourses (including works to the banks) or ponds (that are not to be entirely removed) would be undertaken in a dry working area wherever reasonably practicable. Watercourse channels may have to be temporarily diverted or constricted to facilitate works. This is likely to require temporary diversion of the watercourse, overpumping or fluming the watercourse through the working area or the creation of temporary dams and barriers (for example using straw bales covered with geotextiles and pumping equipment). The PC would ensure that there are more than adequate pumps and pipes onsite for the flows anticipated.

10.14.2 Where overpumping of watercourses would be used during construction (e.g. to enable works within watercourse channels), overpumping pipes would be sized appropriately for the watercourse flows in consultation with regulators. Discharge of peak flows during overpumping would be carefully controlled (as discharging water at high velocities into a watercourse can cause disturbance and erosion of the banks or bed) in accordance with the requirements of the relevant regulator. The exit velocity at the outfall(s) would be reduced, where required, using baffles or similar systems, and the outfall(s) aligned downstream by 45°, ensuring they would not protrude into the channel.

10.14.3 Extent of the vegetation clearance along the riparian corridor would be carried out where required to enable the construction of the proposed scheme. Works would be timed to avoid sensitive periods for protected species where reasonably practicable and appropriate, such as bird nesting periods. Where this cannot be achieved, this would be managed in accordance with advice and, where required, supervision from an ECoW or appropriate supervision and in accordance with any protected species licence requirements. The period for in river works should be programmed to minimise impacts during fish spawning and migration periods (typically October to May) if possible and will be agreed with the Environment Agency. Please refer to **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) for further details. Protection of fish and the need for fish rescue etc. is not considered further in this WMP.

10.14.4 For small areas of work within watercourses it may be possible to isolate an area of the bed using straw bales and/or sand bags (although the latter present greater risk of sediment pollution and should be avoided if possible). Works to the banks may also be undertaken on scaffolding.

10.14.5 The PC should coordinate any works in the channel to periods when low flows are expected by monitoring weather forecasts on a monthly, weekly and daily basis and undertake all works in accordance with the management plans and method statements developed in later design stages. The PC should ensure there are measures in place to alert workers and for removing equipment from the channel when high flows are expected.

10.14.6 Temporary culverts (if required) carrying haul roads or other temporary works across watercourses would be as short as is practicable and tied into the beds and banks to prevent bank instability. This would involve submerging the invert below the bed substrate to prevent bed scour, knickpoint formation and to maintain sediment conveyance. In addition, wingwalls would be aligned with the banks to prevent fluvial processes from outflanking the culvert.

10.14.7 Channels would be reinstated appropriately following the deconstruction of temporary structures in the channel or channel banks (i.e. culverts and outfalls). This would prevent knickpoint formation or additional channel instabilities from occurring. If required, works would be undertaken in accordance with and environmental permit or licence for in-channel/bankside working that would include mitigation to address impacts.

10.14.8 Construction of temporary watercourse crossings would be designed to reduce risk of erosion. Where this is not practicable, bed and bank reinforcement would be placed along areas that are at risk of or have evidence of erosion during the construction of haul roads and temporary watercourse crossings. This would help mitigate construction impacts and aim to reduce the likelihood of increased bed and bank erosion. The type of bed and bank protection would be determined during the detailed design phase.

10.14.9 An oil boom should be positioned across watercourses downstream of sections of the watercourse to which work is undertaken and monitored visually on a daily basis where required.

10.14.10 If required, the PC should ensure that there is equipment onsite for the installation of straw bale dams across the watercourses downstream of the works to trap fine sediments. However, this measure is only likely to be necessary if it is not possible to work in the dry or for in-channel works that are required for longer periods and which may experience periodic periods of higher flows that are redirected along the main channel rather than via the pumped system.

10.14.11 For works above water, scaffolding or debris netting would need to be secured across the channel prior to the removal of any masonry walls etc. and works to the existing culverts to prevent materials and equipment falling into the channel. Scaffolding or debris netting would be regularly inspected and replaced if necessary. Any material that falls into the channel should be removed by the PC. Care should also be taken when using chemicals to avoid spillages into the channel below.

10.15 Use of cement and wet concrete

10.15.1 There would be concrete batching plants located at the main project compounds: Main contractor compound (MA1), Airfield Satellite contractor compound and South Terminal roundabout contractor compound. The area of the batching plants should be sited on impermeable hard standing away from watercourses.

10.15.2 Elsewhere on the proposed scheme it is not anticipated that large volumes of concrete batching would occur onsite. Where reasonably practical, pre-fabricated concrete structures would be used. However, where this is not possible concrete would be delivered to the site in ready mixed lorries for casting in situ. However, some mixing of small quantities of cementitious substances is likely to take place. Where this is required, it should be done on impermeable hard standing away from watercourses (on flat land and further on sloping ground subject to site-specific risk assessment).

10.15.3 Any work involving wet concrete and cement carried out over, under or near a watercourse would be carried out in accordance with the agreed consent from the relevant authority. Where such work is required, detailed method statements would be produced to meet the conditions of the consent, identifying controls that would be implemented to ensure wet cement does not come into contact with controlled waters.

10.15.4 Designated areas would be set out for the purpose of concrete wash out (i.e. for concrete mixer and associated chute, tools or equipment) and care would be taken to ensure concrete washout areas are sited away from sensitive receptors such as watercourses and drains. The PC would detail the method to be used appropriate to the activity, location and sensitivity of the site. Delivery drivers would be made aware of the requirement on arrival at site.

10.16 Surface water and foul water from compounds and welfare facilities

10.16.1 The main site compounds and any temporary or smaller satellite compounds and laydown areas are located away from any waterbodies and watercourses, and where practicable on flat land.

10.16.2 The PC would detail the strategy for the main compound foul, surface, and combined drainage in the detailed design phase.

10.16.3 Any surface flows from compound areas that could be contaminated (for example adjacent to fuel stores) would pass through suitable attenuation and treatment measures prior to discharge to any watercourse (under a permit), such as an oil separator, or otherwise pumped out for offsite disposal at a suitably licensed waste facility.

10.16.4 Foul water could be treated via a Package Treatment Plant system which treats the effluent prior to discharging treated water via the compound drainage system, however a connection to the main sewerage network would be implemented where practical. Where applicable for smaller compounds all waste from welfare facilities would be stored in storage tanks. The storage tanks would be emptied regularly by a tanker (with appropriate waste carrier licence etc.) for offsite disposal at a suitably licenced waste facility.

10.16.5 Under no circumstances would untreated sewage be discharged to the ground, watercourse or to a surface water drainage system.

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Term	Description
CoCP	Code of Construction Practice
COSHH	Care of Substances Hazardous to Health
DCO	Development Consent Order
ECoW	Environment Clerk of Works
ES	Environmental Statement
EU	European Union
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
PC	Principal Contractor
PRoW	Public Right of Way
RoFSW	Risk of Flooding from Surface Water
WMP	Water Management Plan

12 Glossary

12.1 Glossary of terms

Term	Description
AEP	Annual Exceedance Probability
BGS	British Geological Survey