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APPENDIX 9.9

ENVIRONMENTAL MONITORING PLAN

CAVAN REGIONAL SPORTS CAMPUS,

CO.CAVAN MCADAM DESIGN

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1.0 INTRODUCTION

1.1 Report Brief

MCL Consulting (MCL) was appointed by McAdam Design to compile an Environmental Monitoring Plan proposed development of a sports campus to be located on lands north, south and west of Royal School Cavan and west of Breffni Park GAA grounds, County Cavan.

The current proposal includes;

- Indoor sports complex to include sports halls with spectator seating, fitness studios, changing facilities, reception, café and ancillary accommodation.
- 7 no. outdoor sports pitches.
- Covered sports arena with playing pitch, spectator seating and other ancillary accommodation.
- Ancillary sporting facilities include 8 lane athletics track and cricket practice nets.
- New vehicular access / junction and closure of Park Lane/Dublin vehicular junction, relocation of existing Breffni Park turnstiles to facilitate reconfiguration of Park Lane, bridge structure, internal roads, cycle/pedestrian paths, associated car/bus/cycle parking, electric charge points and streetlighting.
- Pedestrian access points of Kilnavara Lane and Dublin Road.
- Hard and soft landscaping including acoustic fencing, wildlife habitat area/corridors, artificial badger-sett, walking trails and other ancillary works such as spectator stands, retaining walls, fencing and ball stop fencing, team shelters, toilet block, floodlighting, signage, drainage infrastructure including attenuation tanks, SuDs and culverting of a minor watercourse, storage space, ESB Substation, ancillary accommodation and all associated site works to accommodate the development.
- The proposed bridge is a single span integral reinforced concrete bridge, supported on piled foundations.

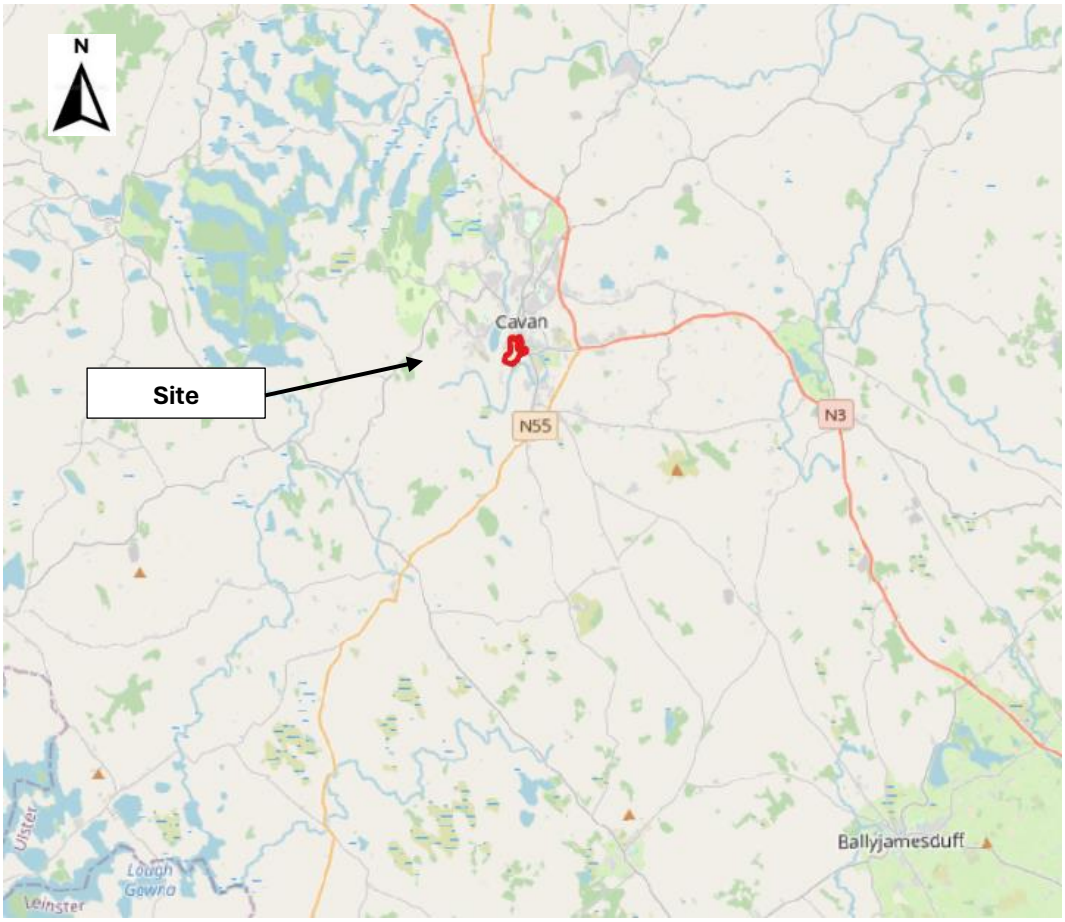
Figure 1: Red Line Boundary outlining the Site Location

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Setting

The site, c.27.5ha, is located in central Cavan, County Cavan, on lands surrounding Royal School, College Street and west/northeast of Kingspan Breffni (IGR: 241769, 303932). A site location map is presented as Figure 1 and the site area is presented as Figure 2.

Figure 2: Site Location Map



The site currently occupied by agricultural land adjacent to Royal College, County Cavan and Breffni Park GAA. The surrounding area is characterised as largely residential, with mixed recreational and commercial land uses surrounding. A summary of the properties / land-use immediately adjacent to the site is presented in Table 1.

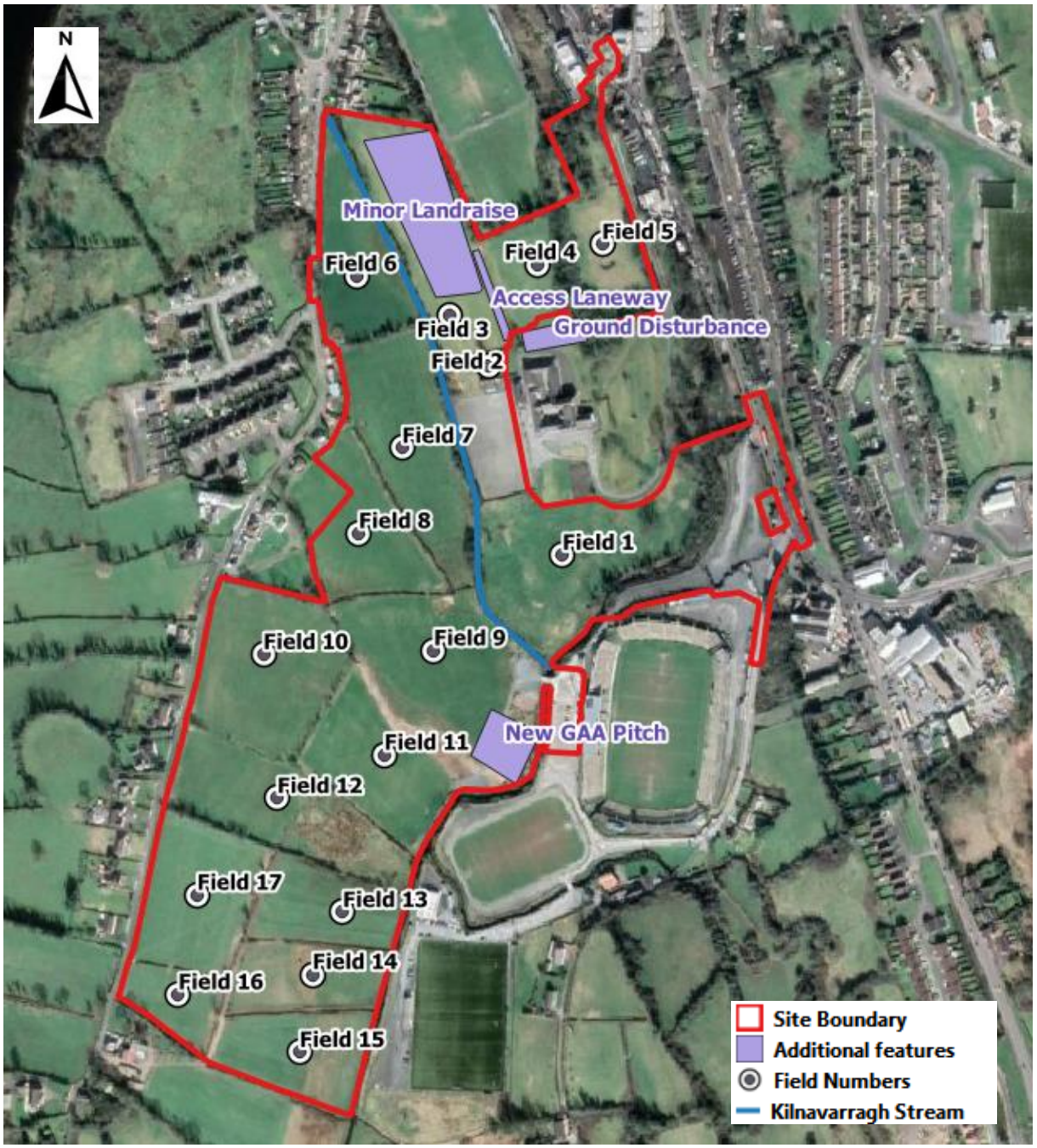
Table 1: Summary of Adjacent Land Use

Orientation from Site	Neighbouring Property/ Land Use beyond Site Boundaries
North	Sport fields are directly to the north of the site with residential/commercial properties beyond this leading into Cavan town.
South	Developed sport fields lie directly to the south with adjacent agricultural fields. Lands beyond this are dominated by agricultural lands with small residential properties within.
East	Residential/commercial properties with agricultural properties beyond.
West	Agricultural/residential properties are adjacent to the site with Sweelan Lough beyond this. Lands beyond this are for agricultural/residential use.

2.2 Site Walkover

A site walkover was undertaken by MCL on 20th April 2023. A tributary of the Cavan River (Kilnavarragh Stream) enters the site via a culvert under the Kinavarragh Lane, flowing southwards in an open wooded channel, before flowing southeast into the Cavan River. This tributary roughly dissects the site into east and west. Therefore, for ease of description, the site can be divided into lands east of Kilnavarragh Stream and lands west of Kilnavarragh Stream as shown on Figure 3.

Figure 3: Separation of Site into field sections



2.2.1 East of Kilnavarragh Stream

This area of site can be accessed via access road into Royal School Cavan. From this access road, there is an all-weather gravel sports pitch used by the school. To the west of this pitch is Kilnavarragh Stream which dissects the site. South of the pitch is Field 1, which is greenfield land. The topography slopes to the south/southeast in this area, where the field borders the Cavan River. There was an area of marshy land in the southwest of this field along Kilnavarragh Stream. Drainage pipes from Breffni Park grounds, were identified flowing into the Cavan River. Looking south from the recently constructed Aggregate

Access Laneway allowing access to farmlands north of new school building, ponded water is noted on the surface of the laneway.

North of Field 1 is a gravel pitch currently used by Royal School Cavan as a Car Park in the south and a Physical Education ground. Slightly upgradient of the Gravel Pitch is a grass field (Field 2). East of Field 2, beyond the site boundary and encroaching into Field 4 is an active construction site, where the construction of a new 2-storey school building structure has recently been completed. Groundworks within this area include a land cut / reprofiling and land-raising in an area behind the new-constructed retaining structure.

To the north of the new school building, within Field 3 and Field 4, localised land-stripping has been undertaken to create a new hardcore access lane. This leads northwards, opening up into a large area of very recent minor land raise. A c.1m thick layer of what appears to be mainly clay materials arising from the school development cut has been spread out over agricultural lands to the north of the school development. The western area of Field 3 and the eastern area of Field 4 have remained mainly greenfield.

Field 5 is located slightly upgradient of Field 4 and is greenfield land. There is then a steep decline in topography eastwards towards the Cavan River.

2.2.2 West of Kilnavarragh Stream

Field 6 and Field 7 are located west of Kilnavarragh Stream. The topography increases west from Field 2 and Field 3 to Field 6 and Field 7. The topography decreases from Field 6 towards Field 7. Field 6, Field 7 and Field 8 are all greenfield land with no previous activities occurring in these areas.

Field 9 can be accessed via a newly-constructed bridge across the Cavan River located within the grounds of Breffni Park GAA grounds car park. The land slopes upgradient in a north west direction from the bridge. In the east of this field, a car park associated with Cavan GAA is currently under construction. A GAA playing pitch has recently been constructed along the south/south west of Field 9. This would have required a programme of ground disturbance cut and fill / alteration of land profile to create a flat platform on what have originally been sloping lands.

The field boundary and associated small area of woodland observed to exist between Field 9 and Field 11, as observed by comparing aerial photography dated between 2021 and 2022, has recently been removed creating a strip of bare / disturbed cleared ground now partly occupied by the new playing field.

In the northwest corner of Field 9, along the boundary with Field 8, a low flowing watercourse enters the site flowing southeast.

Field 10 located upgradient of Field 11, the boundaries of which is separated by a ditch with limited water flow. Field 12 is also separated from Field 10 and Field 11 by a ditch, with limited, stagnant water. Field 10, Field 11 and Field 12 (scrub) are all greenfield land with no evidence of former land use activity.

Field 13-17 are located in the southernmost regions of the site. The walkover of these fields indicated that the vast majority of areas are all greenfield land, with no evidence of contaminating land use evident. There is a clear decrease in elevation between Fields 16 and 17 and the lower Fields 13-15, with the lower fields meeting the Cavan River on the eastern boundary. Fields 13-15 showed extensive flooding during the site visit, likely from field drains present along the field boundaries. The flooding covered a large portion of the eastern sections of the fields.

2.3 Summary of Hydrology and Hydrogeology

The geology of the site includes underlying superficial deposits of glacial till/boulder clay and these are not recognised as potential superficial aquifer, due to low permeability and inability to transmit significant quantities of groundwater.

During the site walkover, the Kilnavarragh Stream of the Cavan River was identified to be dissecting the site into east and west, flowing in an open channel south through the site and converging with the Cavan River along the eastern site boundary. A small watercourse / ditch was observed draining lands north of the school. Various other very small field drains / ditches were recorded along various field boundaries within and around the site.

A review of the FloodInfo Ireland Flood Maps indicates that the western/southwestern areas of the site adjacent to the Cavan River is located within the 'High Probability' for River Flooding. In addition to this, a review of the EPA Ireland online interactive map indicates that the nearest Natural Heritage Area is the Drumkeen House Woodland (000980) c.2.6km north, the Lough Oughter and Associated Loughs SAC (000007) c.3.5km north and the Lough Oughter SPA (004049) c.3.6km northwest. The site is likely to be hydraulically connected to these as the Cavan River flows into these.

2.3.1 Hydrology

According to the EPA Ireland online map viewer, the Cavan River (36C02), flows along the eastern boundary, with the Green lough stream (36G01) joining the Cavan River at the southern most point of the site, as shown below in Figure 4 and Table 2. Kinnypottle Stream (36K05) then joins the Cavan River as a tributary c.360m to the north. The Swellan Lower is located c.310m to the west of the site and flows to the south.

During the site walkover, the Kilnavarragh Stream of the Cavan River was identified to be dissecting the site into east and west, flowing in an open channel south through the site and converging with the Cavan River along the eastern site boundary. A small watercourse / ditch was observed draining lands north of the school. Various other very small field drains / ditches were recorded along various field boundaries within and around the site.

Figure 4: Local Watercourses

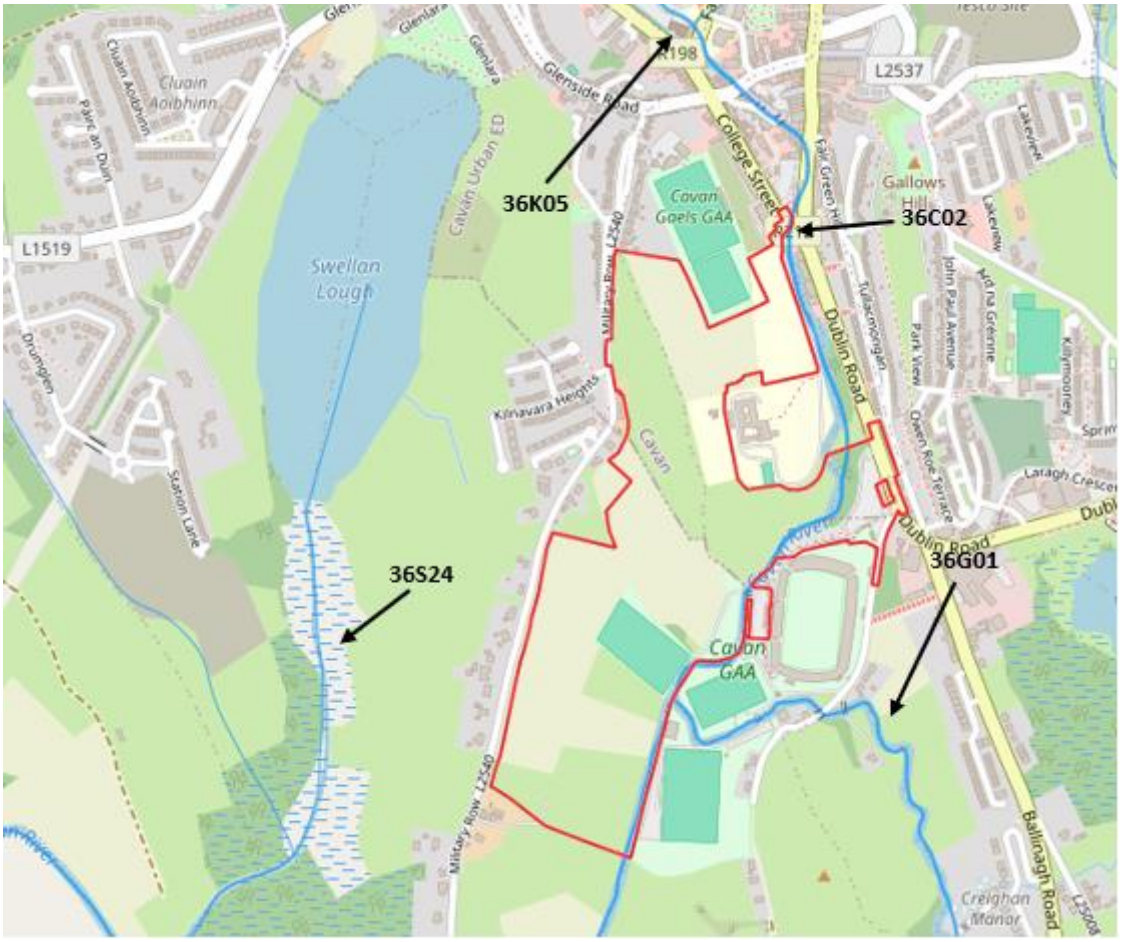
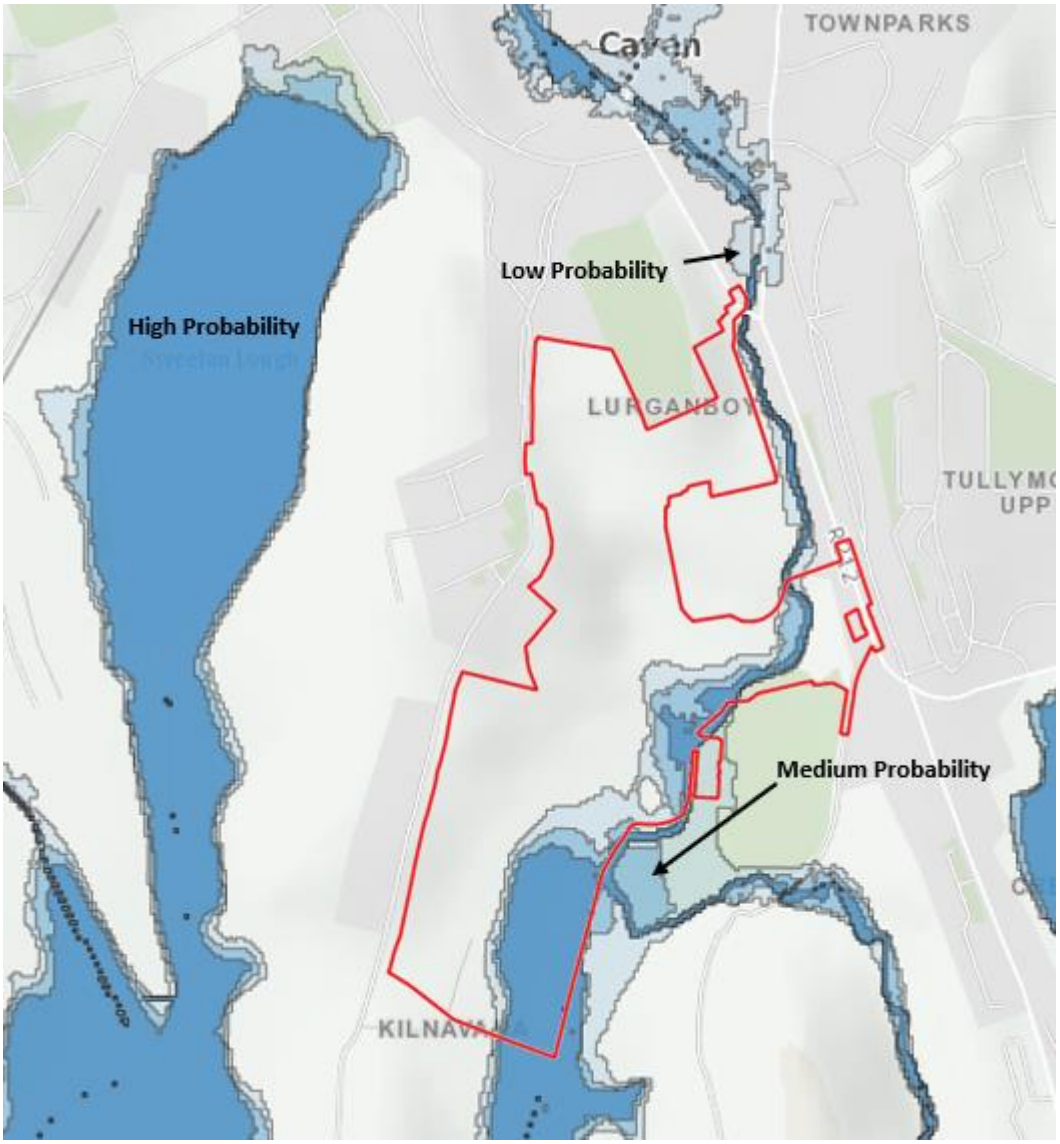


Table 2: Summary of Local Watercourses

EPA Name	EPA Code	Distance from site
Cavan 36	36C02	Eastern border
Kinnypottle Stream	36K05	c.360m north
Swellan Lower	36S24	c.310m west
Green lough stream	36G01	Southern most point

A review of the FloodInfo Ireland Flood Maps indicates that the western/southwestern areas of the site adjacent to the Cavan River is located within the 'High Probability' for River Flooding, as shown below in Figure 5.

Figure 5: FloodInfo Flood Mapping



3.0 SURFACE WATER MANAGEMENT PLAN

The Contractor will be obliged to ensure no deleterious discharges are released from the site to surrounding watercourses during the construction stage. Throughout the works the Contractor will also take account of relevant legislation and best practice guidance including but not limited to the following:

- CIRIA C649: Control of water pollution from linear construction projects (2006);
- CIRIA C741: Environmental Good Practice on Site Guide (2015);
- CIRIA C753: The SuDS Manual (2015);
- CIRIA C769: Guidance on the construction of SuDS (2017);
- DEFRA Good Practice Guide for Handling Soils (MAFF 2000);
- BS 8582:2013 Code of practice for surface water management for development sites; and
- Guidance on Pollution Prevention (GPP) SEPA & NIEA, 2018.

The quality of local watercourse receptors must not be significantly impacted by the construction works, which includes works in and around watercourses. Ensuring good water quality is necessary to protect the important terrestrial and aquatic habitat which has important foraging resources for local wildlife. Being hydraulically linked to the SAC, the protection of surface water quality and flow is essential to ensuring that no negative impact to the SAC results during the construction phase.

A range of mitigating measures have been designed to protect surface waters during the construction phase. These include the following key mitigating measures:

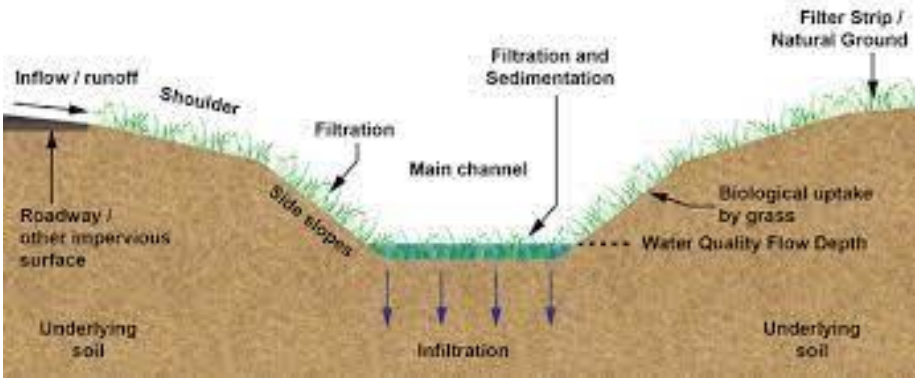
- Pollution Prevention Plan to be prepared prior to the commencement of works.
- Emergency Response Plan to be implemented following spillage events.
- Pluvial flooding management.
- Good stockpile management to prevent erosion.
- Ground surface management to prevent erosion after vegetation/topsoil clearance and during vegetation colonisation following placement of landscaped features.
- Buffer zones of 10m around water courses for stockpiling.
- Silt and pollution management measures shall be as follows:-
    - Appropriate storage of stockpiled piling wastes, 10m from nearest watercourses.
    - Concrete pouring near or in watercourses to be within protective barriers to prevent dispersion.
    - Silt fencing to be deployed between piling excavations and the nearest watercourse.

- No site runoff from working areas should enter the watercourse directly.
- Temporary SuDS systems such as swale collection trenches, infiltration trenches / sumps should be sued to control surface water runoff.
- The use of quick setting cements, grout and concrete for use near watercourses
- Fuels and chemicals to be stored within bunded areas with at least 110% storage volume and at least 10m away from any minor watercourse, ditch or drainage channels.
- Spillage kits to be immediate available in working areas.
- Stationary plant to be fitted with drip tray that are regularly emptied or stored within bunded area on an impermeable surface.
- Vehicles / piling equipment to be regularly inspected and maintained.
- The use of quick setting cements, grout and concrete for use near watercourses
- Concrete pouring near or in watercourses to be within protective barriers to prevent dispersion.
- Fuels and chemicals to be stored within bunded areas with at least 110% storage volume and at least 10m away from any minor watercourse, ditch or drainage channel.
- Spillage kits to be immediate available in working areas.
- Stationary plant to be fitted with drip tray that are regularly emptied or stored within bunded area on an impermeable surface.
- Vehicles to be regularly inspected and maintained.

- On-site Personnel training.
- Obtain relevant consents for all proposed environmental discharges and in-river works.
- Undertake environmental monitoring at sensitive site boundaries for deposited dust.
- Undertake environmental monitoring for surface waters and groundwaters in accordance with the outline Environmental Monitoring Programme.

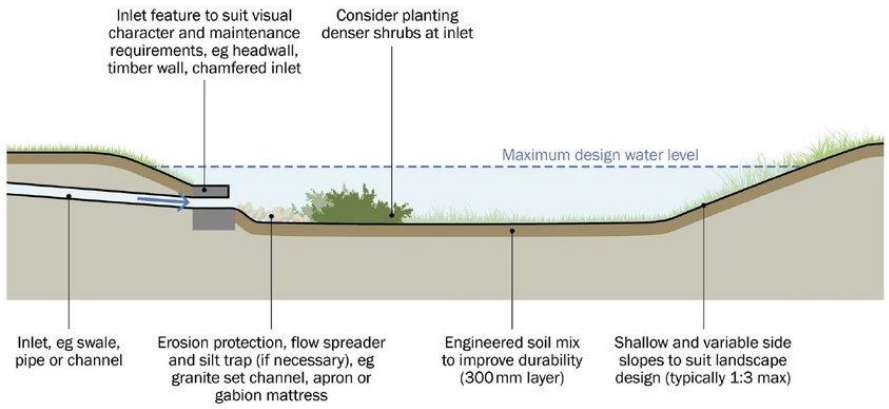
Examples of Construction Phase temporary SuDS Engineering to be deployed are as follows:-

Swales



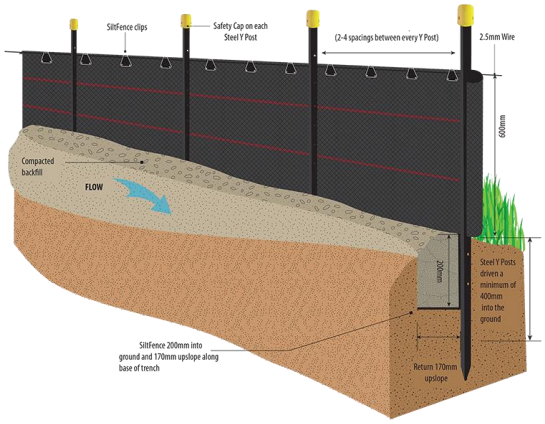
A swale is an elongate vegetated drainage channel designed to capture runoff drainage from upgradient areas of the construction site. The swale is designed to encourage / maximise infiltration of runoff waters through the permeable base / sides as it is transferred to the end point of the swale. The swale is vegetated to provide attenuation of sediment and other pollutants which may be present and therefore also comprises a source-control treatment step.

Infiltration Sump / Pond



A temporary depression can be made at the end of or within a swale complex, or downgradient of the construction site area / area of ground disturbance, cut / fill or other works which may generate sediment. This can receive treated overflow waters from swale outfall or direct input from land runoff. It will generally be grassed / vegetated and lined with aggregate to encourage infiltration to substrate.

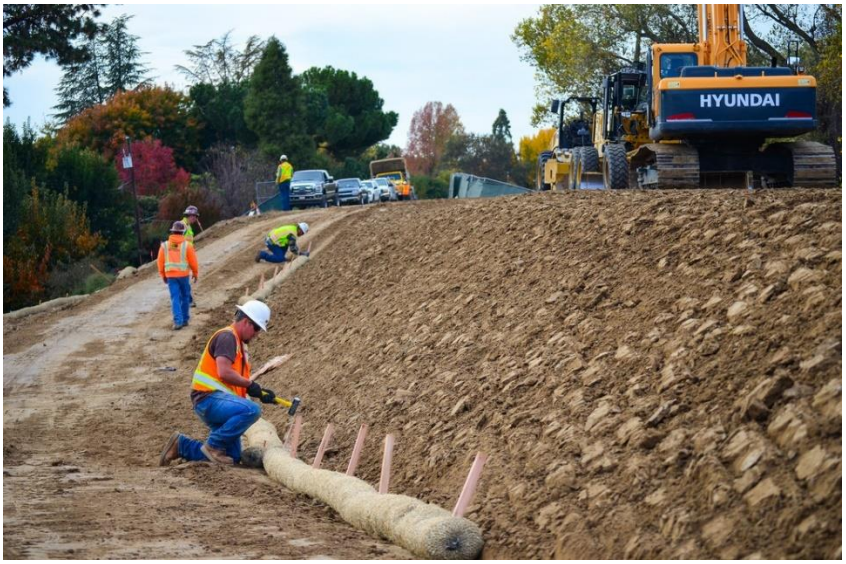
<u>Silt Fencing</u>



Silt fencing, with associated capture trench, shall be installed across any working areas upflow of the nearest watercourse to act as an emergency capture in the event of failure of other containment measures. Several sections of parallel silt fencing can be installed in high risk situations to act as additional barriers to sediment release.

Silt Matting and Straw

Sediment matting and straw bales can be used as sediment trap where silt fencing is difficult to install, or as an additional sediment control measure. These can be laid in elongate sections along ridges of excavations, at the base of excavation slopes, and within swales / infiltration basins etc.



It is important that silt fending and other pollution protection measures are regularly inspected, sediment removed and systems maintained to ensure ongoing efficiency. This infrastructure should therefore be inspected by the ECoW on a daily basis and any flaws / failures reported to the main contractor. Works should not proceed unless all measures are in place to the satisfaction of the ECoW.

Any areas where land formation is completed shall be planted out / seeded as quickly as possible to minimise the timeframes for soils to stabilise and limit the areas of exposed soils to minimise the generation of sediment-laden runoff. Protection measures shall remain in place until the ECoW has agreed that the risk of sediment release has been normalised.

The piling works have designed to minimise impacts to the soils and waters environments. In terms of piling works the following mitigation measures will apply to the construction phases:-

- Works Method Statements and Risk Assessments to be provided and approved in advance see **Appendix 7** for appropriate templates).
- Spillages / Pollution Risk Assessment to be provided and approved in advance see **Appendix 8** for appropriate templates).
- Appropriate PPE to be worn during works.
- Piling operatives to have appropriate levels of operational training and experience.
- Appropriate records of piling works to be retained for inspection by designers.
- In advance of works soils and ground gas testing to be carried out on materials likely to be generated from piling works to assess human health risks (construction workers).
- All piling should be low vibration techniques to protect terrestrial and aquatic species from noise and vibration risks.
- Groundwater occurrences should be recorded and reported to design engineers.
- Piling shall not exceed design depths. Any changes to piling designs to be agreed by designers.
- Appropriate storage of stockpiled piling wastes, 10m from nearest watercourses.
- Concrete pouring near or in watercourses to be within protective barriers to prevent dispersion.
- Silt fencing to be deployed between piling excavations and the nearest watercourse.
- No site runoff from working areas should enter the watercourse directly.
- Temporary SuDS systems such as swale collection trenches, infiltration trenches / sumps should be sued to control surface water runoff.
- The use of quick setting cements, grout and concrete for use near watercourses
- Fuels and chemicals to be stored within bunded areas with at least 110% storage volume and at least 10m away from any minor watercourse, ditch or drainage channels.
- Spillage kits to be immediate available in working areas.
- Stationary plant to be fitted with drip tray that are regularly emptied or stored within bunded area on an impermeable surface.
- Vehicles / piling equipment to be regularly inspected and maintained.

Once the site has revegetated following completion of construction works temporary infrastructure shall be removed and the ground reinstated following completion of each construction phase.

Earthworks / Excavations

To minimise the risk of erosion, topsoil stripping, cut and fill and other necessary excavation works shall be undertaken in a phased manner and limited to areas where earthworks are immediately programmed.

There shall then be restoration of bare surfaces (seeding and planting) throughout the construction period as soon as possible after the work has been completed or protecting exposed ground with geotextiles if to be left exposed. Existing topsoil and cut materials will be retained on site to be used for the proposed development, subject to stockpiling controls including appropriate buffers (10m for all watercourses).

Removal of vegetation from the riparian corridor shall be limited and retaining vegetated buffer zone should be considered wherever reasonably practicable. A 10m buffer zone will be in place around watercourses where there are no works currently being undertaken to reduce risk of pollution events or sedimentation.

Dust control measures shall be employed where there is the potential for wind to erode earth works (particularly in exposed areas). Common methods for dust control in soil include; water suppression and the use of covers / screens (where practicable) for fine materials e.g. sand. Deposited Dust monitoring will be required for the duration of the construction works.

Construction Phase Silt Management Drainage Features

All construction runoff water will be passed through on-site treatment facilities, with infiltration of runoff maximised. It is preferred that there is no direct discharges to the Cavan River from the construction site, however, there will be provision for stormflow runoff in the event of a sustained heavy rainfall event. These treatment facilities may be a combination of temporary water transfer infiltration swales, holding ponds and soakaway pits. During the construction stage accumulated sediment will be removed on a periodic basis.

It is inevitable that some water will enter the construction site and runoff will entrain sediment. Measures to control this sediment and minimise the amount travelling off site into the wider water environmental may include the installation of silt fences, check dams, bunds, and other sediment trap structures as appropriate.

Positioning of these measures will be an important aspect of their efficacy i.e., downslope of overland flow paths, sufficiently setback from water edges to minimise pollution in the event of failure. Retaining a grassed buffer zone or compacted earthen berms can also prevent direct runoff of waters from the construction site to watercourses. Any of these control measures will require regular inspection and maintenance to remove sediment that may compromise the efficiency of the measure.

Non-engineering solutions and green engineering (e.g., vegetation, geotextile matting) can also be placed downslope of earth works to help capture silt laden runoff from earthworks.

Timing / Phasing of Works

The timing of specific construction works can help minimise erosion and reduce sediment controls needed on site. For example, checking weather forecasts to avoid heavy rainfall events or take preparatory actions. Programmes of Works should also be mindful of restricted time periods e.g., known migration / spawning periods (where applicable). Refer to Section 3 of this oCEMP for further detail on specific ecological constraints.

Stockpiling

Unnecessary stockpiling of materials will be avoided. Any required stockpiling should be minimised on site (spatially and in duration) to reduce the amount of contaminated run-off generated.

Areas of stockpiling / material deposition shall be appropriately lined, located away from watercourses (e.g., minimum setback of 10m). Stockpiles of topsoil / soils will be covered / dampened during dry weather to prevent spreading of sediment / dust.

In advance of construction, silt fences and bunds shall be provided around the footprint of any stockpiles. Any runoff generated on the construction site around the stockpiles shall be captured by peripheral cut-off ditches and directed to settlement lagoons and / or sediment tanks which will be provided upstream of the outfall to the receiving watercourse.

Stockpiles shall be protected against rain splash and wind erosion by geotextile matting. Plastic sheeting should be avoided as this has the propensity to transfer erosion problems because water will sheet flow off the plastic at high velocity.

Works in Watercourses

Works to existing surface watercourses (such as installation of temporary or permanent culverts or bridges) have the potential to cause an obstruction to flow and may alter conveyance capacities, potentially causing temporary restrictions in watercourse channels, affecting upstream water levels and increasing flood risk.

The same principles of good practice that apply to permanent crossings also apply to temporary river crossings. Their design should prevent access track / road run-off from entering watercourse, reduce risk of erosion and not increase flood risk. Inappropriately sized crossings can cause flooding by being too small to cope with the flow and / or becoming blocked by debris, therefore, hydrological calculations and examining available flow and rainfall records should be undertaken when considering crossing design.

Good practice methods should be adhered to in order that installation of outfalls does not cause or generate erosion of land, banks or beds during construction phase.

Concrete, Cement and Grout

The use and management of concrete, cement and grout should be carefully controlled to avoid spillage which could potentially have an adverse impact on the water environment. Quick setting products (cement, concrete and grout) will be used for structures that are in or near to watercourses.

Wash-water should not be discharged to the water environment but should be disposed of appropriately through containment and disposal to an authorised waste disposal site.

Chemical Storage, Handling and Re-use

Chemical, fuel and oil storage will be undertaken within a site compound, which will be located on stable ground at a low risk of flooding and at least 10m from any watercourse. The stores will also be locked and sited on an impervious base within a secured bund with 110% of the storage capacity.

Pesticides, including herbicides, will only be used if there are no alternative practicable measures, and will be used in accordance with the manufacturer's instructions and application rates.

Refuelling and Storage of Fuels

Only designated trained and competent operatives will be authorised to refuel plant and all refuelling will be undertaken at designated refuelling areas (e.g., construction compounds). Appropriate measures will be adopted to avoid spillages.

Oil / Fuel Leaks and Spillages

Stationary plant will be fitted with drip trays and emptied regularly, and plant machinery will be regularly inspected for leaks with maintenance as required. Spillage kits will be stored at key locations on-site, and all construction activities will comply with a Pollution Incident Control Plan to be prepared by the appointed Contractor prior to commencement of works.

Construction Compounds

It is envisaged that there would be a number of Construction Compounds for each phase of the development site, as shown in the Construction Layouts, **Appendix 5**.

Compounds will be located at least at least 10m away from any open minor watercourse, ditch or drainage channel. Measures will also be implemented to manage silt laden surface water runoff from the compound to direct water to treatment facilities as not to discharge directly to nearby watercourses. The compounds shall not be constructed in areas known to be at risk of flooding.

There will be no discharge of effluent to surface water during the construction phase. All wastewater from the construction facilities will be stored for removal off site for disposal and treatment.

Wheel Washes / Plant Washes

For vehicles and plant leaving material deposition / stockpile areas, self-contained wheel wash facilities shall be installed at the exit and all vehicles will be required to pass through them.

To prevent the spread of hazardous Invasive Species and pathogens, high pressure steam cleaning of all items of plant and equipment to be used at and adjacent to waters must be undertaken prior to use.

Monitoring

Daily visual water quality assessments should be undertaken by the appointed Environmental Clerk of Works (ECoW) who will remain on site to monitor construction activities for signs of pollution and advise on the deployment of control measures. A Pollution Prevention Plan (PPP) must be prepared by the Contractor prior to the commencement of works.

An outline Water Quality Monitoring Programme has been developed which sets out locations and sampling schedules for appropriate surface water quality and groundwater sampling points. This programme will be implemented to monitoring for any degradation of water quality during the works, with procedures in place to manage any breaches. Baseline monitoring is included to establish relevant Control and Trigger levels of key parameters. Post-Construction monitoring is included for confirmation against baseline conditions.

On Site Personnel Training

The CEMP will form part of the site induction for site operatives and a record of inductions will be kept in the site compound and be available for inspection. All site personnel will be made aware of the importance of the requirement to avoid pollution of all types, throughout all stages of the construction phase.

The Contractor will be obliged to ensure no deleterious discharges are released from the site to surrounding watercourses during the construction stage. Throughout the works the Contractor will also take account of relevant legislation and best practice guidance including but not limited to the following:

- CIRIA C649: Control of water pollution from linear construction projects (2006).
- CIRIA C741 Environmental Good Practice on Site Guide (2015).
- CIRIA C753 The SuDS Manual (2015).
- CIRIA C769 Guidance on the construction of SuDS (2017).
- DEFRA Good Practice Guide for Handling Soils (MAFF 2000).
- BS 8582:2013 Code of practice for surface water management for development sites.
- Guidance on Pollution Prevention (GPP) SEPA & NIEA, 2018.

4.0 WATER QUALITY MONITORING PROGRAMME

It is proposed to implement a programme of surface water and groundwater quality monitoring for the duration of the works. This will comprise the following key elements:

- Baseline (pre-commencement) Survey.
- Construction Phase Routine Monitoring.
- Re-sampling and investigations where necessary for exceedances of EQSs or increasing trends of contamination levels.
- Post-completion Survey.

4.1 Surface Water Monitoring

Suitable surface water quality monitoring points have been established based on the results of the Water Features Survey. These are described in Table 3. The monitoring points have been selected to allow for both up flow and downflow water quality to be monitored, such that downflow data can be compared to assess any impacts occurring.

Table 3: Proposed Surface Water Quality Monitoring Network

Surface Water ID	Description	Notes
SW1	**Upflow:** Southern boundary of the site	Cavan River
SW2	**Midflow:** Along the eastern boundary of the site, close to the current pitches	Boundary of current gravel sports pitch used by school. Upflow of SW1.
SW3	**Midflow:** Outside eastern section of boundary	Along the Cavan River. Upflow of SW2.
SW4	**Downflow:** Northern boundary of site	Along the Cavan River. Upflow of SW3.
SW5	**Upflow:** Northern boundary of site	Outfall pipe into the Kilnavarragh Stream.
SW6	**Downflow:** Kilnavarragh Stream	Prior to the Kilnavarragh Stream flowing into the Cavan River
SW7	**Upflow:** Along eastern boundary	Tributary from Southeast into the Cavan River

The locations for all proposed surface water sampling for Cavan is presented in Figure 6. The proposed surface water monitoring schedule for Cavan is presented in Table 4.

Figure 6: Surface Water Sampling Points

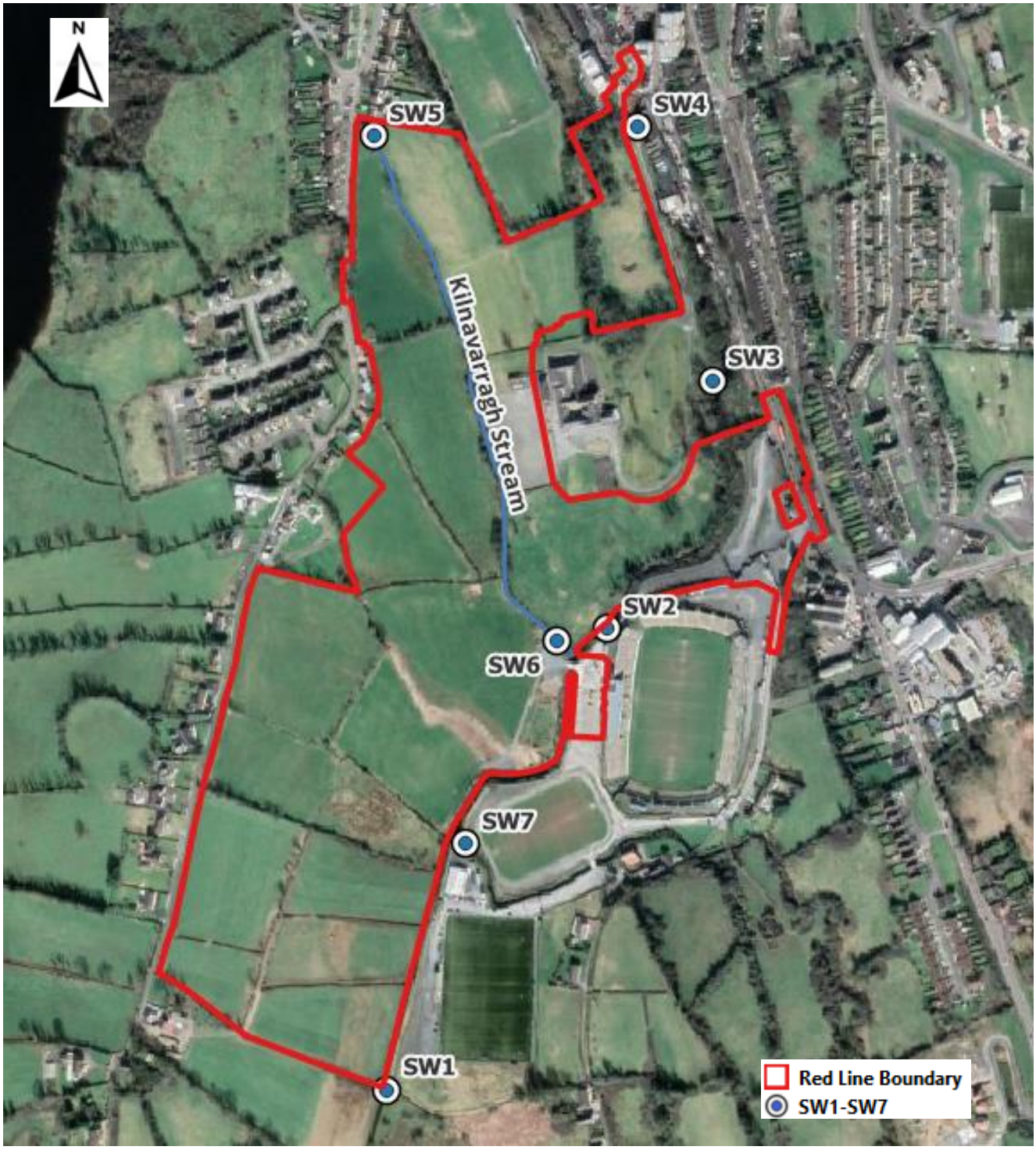


Table 4: Proposed Surface Water Monitoring Schedule

Parameter Suite	Monitoring Frequency
Visual inspection of Turbidity and Colour.	Baseline then, Daily then, Post-completion (within 1 month)
Field readings: Temperature, EC, pH, DO, Ammonia	Baseline then, Weekly then, Post-completion (within 1 month)
Lab Testing: Total Cyanide, Free Cyanide, PAH 16, TPH Total, BTEX, VOCs, Phenols, pH, Sulphate, Electrical Conductivity, BOD, COD, Ammoniacal Nitrogen, NO_2, NO_3, Colour, Odour, Chloride, PO4, Total Alkalinity, Total Hardness, TDS, TOC, Total Surfactants, Suspended Solids	Baseline then, Monthly for duration of works then, Post-completion (within 1 month)

4.2 Groundwater Monitoring

Suitable groundwater quality monitoring points have been established through the drilling of boreholes as part of the GQRA, locations presented in Figure 7.

The proposed groundwater monitoring schedule is presented in Table 5. The positions of the relevant installed boreholes available for sampling are provided in Figure 7.

Figure 7: Groundwater Monitoring Points

Table 5: Proposed Groundwater Quality Monitoring Network

Groundwater ID	Description
SBH02	Northern section of the site
SBH07	Northern section of the site
SBH09	Northern section of the site
SBH12	Northern section of the site
SBH16	Central section of the site
SBH19	Central section of the site
SBH20	Central section of the site
SBH22	Southern section of the site
SBH24	Southern section of the site
SBH25	Southern section of the site

Where any groundwater boreholes are damaged or require re-positioning to accommodate the progression of the development, replacement boreholes must be drilled.

Table 6: Proposed Groundwater Monitoring Schedule

Parameter Suite	Monitoring Frequency
Visual inspection of Turbidity and Colour.	Baseline then, Daily then, Post-completion (within 1 month)
Field readings: Temperature, EC, pH, DO, Ammonia	Baseline then, Weekly then, Post-completion (within 1 month)
Lab Testing: Total Cyanide, Free Cyanide, PAH 16, TPH Total, BTEX, VOCs, Phenols, pH, SO4, EC, BOD, COD, Ammoniacal Nitrogen, Chloride, NO_2, NO_3, Cl, PO4, Total Alkalinity, Total Hardness, TDS, TOC, Total Surfactants, Suspended Solids	Baseline then, Monthly for duration of works then, Post-completion (within 1 month)

4.3 Sampling Procedures

Samples for laboratory testing shall be obtained by a qualified environmental scientist and sent to an appropriate laboratory for UKAS-accredited testing in line with standard sample Duty of Care protocols. Laboratory detection limits for all parameters shall be suitably low to allow for comparison against environmental EQS Standards.

Routine monitoring data should not show any significant degradation in downflow water quality compared to the upflow conditions and baseline data, subject to any seasonality. The above self- monitoring should be carried out in additional to any monitoring that may be required under conditions of regulatory discharge consents.

4.4 Re-Sampling and Investigation Procedures

Where any significant deterioration in downflow water quality is identified by monitoring, the following procedures will be implemented:

- Re-sampling of relevant sampling points for relevant parameter as soon as possible after the sample failure.
- Where re-sample results passes, record event for reporting, no further action.
- Where re-sample confirms failure:
    - Carry out further investigations to identify the source / cause and implement additional appropriate environmental controls / changes to work practices to remedy the situation.
    - Undertaken further re-sampling to confirm remedy is effective.
    - Repeat process in the event that failure is persistent.

4.5 Reporting

An interpretative Baseline Report on water quality monitoring data shall be prepared for the baseline (pre-commencement) monitoring. This shall establish appropriate Control and Tigger Thresholds for key monitoring parameters, including Suspended Solids, Chloride, BOD and TPH.

Monthly interpretive reports shall be provided for the duration of the construction phase, detailing all routine tests and results of any re-sampling, investigations, additional mitigation measures of required.

5.0 AIR QUALITY MONITORING PROGRAMME

5.1 Purpose of Air Quality Monitoring

It is essential to give full and proper consideration to the purpose of monitoring during the construction works before any strategy is finalised. Monitoring shall be carried out in order to fulfil the following objectives:

- To ensure that the construction activities do not give rise to any exceedances of the air quality objectives for PM10 and/or PM2.5, or any exceedances of recognised threshold criteria for dust deposition/soiling;
- To ensure that the agreed mitigation measures to control dust emissions are being applied and are effective;
- To provide an "alert" system with regard to increased emissions of dust, and a trigger for cessation of site works or application of additional abatement controls;
- To provide a body of evidence to support the likely contribution of the site works in the event of complaints; and
- To help to attribute any high levels of dust to specific activities on site in order that appropriate action may be taken.

5.2 Air Quality Monitoring

It is proposed to implement a programme of Air quality monitoring for the duration of the works. This will comprise of the following key elements:

- Baseline (pre-commencement) Survey.
- Construction Phase Routine Monitoring.
- Re-sampling and investigations where necessary for exceedances of EQSs or increasing trends of contamination levels.

5.2.1 Monitoring Methods

It is proposed to carry out dust monitoring at sensitive receptors located around the boundary of the site which should be agreed with the Local Authority.

The following methods are proposed:

- Dust deposition,
- Dust flux,
- Active real-time PM10 continuous monitoring.

Where possible commence baseline monitoring at least three months before work commences on site or, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

5.2.2 Additional dust monitoring mitigation

- Undertake daily on-site and off-site inspection, 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 windowsills within 100 m of 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.
- 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 are being carried out and during prolonged dry or windy conditions.

5.3 Site Action Levels

It is common practice to set Site Action levels for PM concentrations and/or dust deposition/flux/soiling rates, as a mechanism to ensure that dust mitigation measures are both adequate and are being applied correctly. It can be useful practice for site operators to sign up to daily pollution forecasts so they become aware if moderate or high PM levels are likely; in these events additional mitigation may be applied.

PM10 levels

- A Site Action Level of 190 µg/m3, measured as a 1-hour mean PM10 concentration, has been widely adopted.

Dust Deposition

- Frisbee-Type deposition gauge: 200mg/m3/day
- Sticky pads: 5% EAC/day, measured over 1-week period

Dust Flux

- Sticky pads where both EAC and AAC are measured over a 1-week period. It is suggested that a site action plan level is “High

6.0 NOISE MONITORING PROGRAMME

- Noise barriers used around the site boundary to protect noise sensitive receptors for the duration of construction works,
- Plan the hours of work to consider the effects of noise and vibration on noise-sensitive receptors, taking into account the existing ambient levels, the duration of works and consequences of pro-longed periods of work,
- Extracting and loading plant/machinery should be switched off when waiting and not left in idle to reduce the 'on' time and hence the $L_{Aeq,1hour}$,
- Quiet working methods should be chosen by identifying use of the most suitable plant and reasonable hours of operation for noisier operations. Large haulage vehicles should be constricted to arrive and leave the site between 0800 and 1700 during the week days, and 0800 to 1200 on Saturdays,
- Noise is to be considered at source in the first instance. Noise control measures after the source are to be considered once the source is minimised as far as practically possible,
- Regular monitoring of noise levels should be in place, to check compliance with the limits agreed at the noise-sensitive receptors, and keep in good relation with the community,
- Appropriate signage should be displayed if high levels of noise is expected and where necessary, ear protectors should be provided,
- Maintain appropriate distances from the nearest noise-sensitive receptors to reduce the noise exposure.

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