Cardiff Parkway developments Limited

Cardiff Hendre Lakes

WFD Screening Assessment

WFD/01

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Contents

1 Introduction

1.1 Project Background

Arup has been commissioned by Cardiff Parkway Developments Limited (CPDL) to undertake a Water Framework Directive (WFD) Compliance Assessment to support the outline planning application for Cardiff Hendre Lakes (the 'proposed development'). This application is being submitted by CPDL with all matters reserved for the following development:

"*Construction of a business park (up to 90,000m^2 - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes.*

Together with the construction of a new transport hub facility, comprising railway station buildings (up to 1,500m^2 - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 600 no. spaces), and associated infrastructure works at land to the south of St Mellons Business Park."

The proposed development as described above has been split into two distinct areas; the business district and the railway station element of the development, known as 'Cardiff Parkway'. The site is centred on National Grid Reference (NGR) ST251808 and the planning boundary is shown on ES Volume 1 Figure 1.1.

1.2 Purpose of this report

Under the WFD[1], all proposed schemes with the potential to impact upon WFD-designated water bodies must be assessed to ensure:

- no deterioration of the current status or potential of any WFD quality elements; and
- no prevention of future attainment of the 'good' status or potential objectives of any WFD quality elements.

This report follows guidance produced by Natural Resources Wales[2] (NRW) and The Planning Inspectorate[3] to produce a WFD Screening Report which identifies the activities related to the proposed development that may cause deterioration or prevent a water body from meeting its objectives. Activities noted as having the potential to cause deterioration or prevent a water body from meeting its

[1] European Commission. Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.
[2] Natural Resources Wales. OGN72 Draft Guidance for assessing activities and projects for compliance with the Water Framework Directive.
[3] The Planning Inspectorate. Advice Note 18: The Water Framework Directive (June 2017). Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf

objectives will be subject to further assessment following consultation and agreement with NRW.

1.3 Other relevant reports

This WFD Assessment should be read in conjunction with the following key documents that form part of the ES for the proposed development:

- ES Scoping report;
- ES Technical Reports: This comprises the description of the proposed development, the baseline conditions, an assessment of the likely significant environmental effects resulting from the proposed development, and proposed measures to mitigate those effects. Key assessment chapters of relevance include;
    - Chapter 7: Ecology and Biodiversity;
    - Chapter 8: Ground Conditions; and
    - Chapter 10: Water Environment.
- ES Figures: This comprises supporting figures, plans and other illustrations or visualisations cross referenced throughout the technical reports;
- ES Appendices: This comprises the supporting technical information such as baseline surveys and detailed impact assessments cross referenced throughout the technical reports. Key appendices of relevance include:
    - Outline Construction Environmental Management Plan (CEMP) in Appendix A2;
    - Flood Consequences Assessment in Appendix C1;
    - Drainage Statement in Appendix C3; and
    - Ground Investigation (GI) reports in Appendix D1 – D5.

2 Legislative Context

The EU WFD has been in force since 2000 and is currently the largest and most influential piece of EU legislation relating to the water environment. The Directive was transposed into UK law by The Water Environment (Water Framework Directive) (England and Wales) Regulations (amended 2017). NRW is the competent authority responsible for delivering the Directive in Wales.

The WFD aims to protect and enhance the quality of the water environment across all EU Member States. It takes an integrated approach to the sustainable management of water by considering the interactions between surface water, groundwater and water-dependent ecosystems.

Under the WFD, ‘water bodies’ are the basic management units and are defined as all or part of a river system or aquifer. These water bodies form part of a larger

River Basin District (RBD), for which River Basin Management Plans (RBMPs) are developed by EU Member States and environmental objectives are set. These RBMPs are produced every six years, in accordance with the river basin management planning cycle.

The WFD requires all EU Member States to classify the current condition or 'status or potential' of surface water and groundwater bodies and to set a series of objectives for maintaining or improving conditions so that water bodies reach and/or maintain 'good status or potential'. These overall Environmental Objectives are to:

- prevent the deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- aim to achieve at least 'Good' status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve Good status by 2021 or 2027;
- meet the requirements of Water Framework Directive Protected Areas;
- promote sustainable use of water as a natural resource;
- conserve habitats and species that depend directly on water;
- progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- contribute to mitigating the effects of floods and droughts.

All new (and current on-going) activities in the water environment now need to be guided by the requirements of the WFD. This includes ensuring that no changes occur that causes a deterioration of current status of a water body or prevents the achievement of the future status objectives of a water body. This principle is now integrated into the planning permission application process for proposed developments/activities.

3 Project Details

Table 1 provides a summary of the development description. For further details of the proposed development see Chapter 3: Proposed Development in Volume I: Main Report of the ES.

Table 1: Details of the proposed development.

Project Details	
Applicant name	Cardiff Parkway developments Limited
Application reference number (where applicable)	Not yet applicable

Description of activities	CPDL are proposing to develop an employment led development: • A business park (up to 90,000m2 - B1, B2 and B8), ancillary uses, and infrastructure associated with; biodiversity; landscape; drainage; walking, cycling and other transport modes. • A new transport hub facility, comprising railway station buildings (up to 1,500m2 - Sui Generis) including ancillary uses, 4 no. platforms, surface car park (up to 600 no. spaces), and associated infrastructure works at land to the south of St Mellons Business Park." Direct physical modifications to surface water features include: • Introduction and construction of culverts or bridges for the temporary construction traffic route crossings over Greenlane Reen, Ty-Ffynon Reen, Faendre Reen and unnamed reens; • Construction of culverts or bridges for the proposed development access routes crossing over Faendre Reen, Green Lane Branch, Greenlane Reen, Ty-Ffynnon and Railway Reen; • Removal of the existing unnamed reens shown in Figure X.4 to provide development plateau; • Widening of Greenlane Reen by 3m between Cobol Road / Heol Las junction down to the field access from Heol Las located north of the gas pressure reduction station, located near the south eastern corner of the site; • Lowering of ground for flood conveyance between Faendre Reen and Ty-Ffynnon Reen and the construction of low flow channel; • New compensatory reens south of the railway; and • Installation of a penstock or tilting weir penstock located along the existing Primary Reens, namely Railway and Greenlane Reens
Location of activity (central point XY coordinates or national grid reference)	ST 25009 81195
Footprint of activity (ha)	102.1 ha
Timings of activity (including start and finish dates)	Not yet known.

4 WFD Assessment Methodology

4.1 Scope of Assessment

The assessment comprises up to three stages, as recommended by The Planning Inspectorate[4], to assess the potential for each proposed activity (individually and in combination) to impact on individual (or multiple) WFD quality elements:

1. Screening - exclude any activities that do not need to go through the scoping or detailed assessment stages;
2. Scoping - identify the quality elements that are potentially at risk from the proposed activity and need further detailed assessment; and
3. Detailed Assessment - consider the potential impacts of an activity on bodies of surface and ground water, identify ways to avoid or minimise impacts, and identify if an activity may prevent the water body achieving good status or cause deterioration.

At each screening and scoping stage, if effects are ruled out, no further assessment is required.

4.2 Data Sources

The following data sets and resources from NRW and the Environment Agency have been used to inform this assessment:

- Lle: Welsh Government Geo-Portal[5]
- Natural Resources Wales 'Water Watch Wales'[6] – WFD data
- Severn River Basin District River Basin Management Plan (RBMP)[7]
- Historic OS maps[8];
- Ordnance Survey (OS) Open Data[9]; and
- Natural England 'MAGIC' website[10]

[4] Advice Note Eighteen: The Water Framework Directive. The Planning Inspectorate, June 2017.
[5] http://lle.gov.wales/home (last accessed 10/04/2020)
[6] http://waterwatchwales.naturalresourceswales.gov.uk/en/ (last accessed 10/04/2020)
[7] Water for lifee and livelyhoods – River Basin Management Plan Severn River Basin District https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718336/Severn_RBD_Part_1_river_basin_management_plan.pdf (Last accessed 22/04/2020)
[8] National Library of Scotland – historical OS maps. Available at: http://maps.nls.uk/os/
[9] Ordnance Survey Open Data maps. Available at: https://www.bing.com/mapspreview
[10] MAGIC maps: : http://www.magic.gov.uk

5 Baseline Information

5.1 WFD Surface waterbodies

The proposed development is within the Gwent Levels reen system, which is designated as a Site of Special Scientific Interest (SSSI), largely due to habitats and species supported by the water environment[11]. Several reens and drainage ditches cross the site, including Greenlane Reen, Ty-Ffynnon Reen, Railway Reen and Faendre Reen, which flows along the western edge of the site. Water levels in these reens are penned at static summer and winter levels by a series of sluices across and beyond the proposed development area.

The site is within the 'Broadway Reen – source to R Severn Estuary' (GB109056073370) river WFD water body, which is designated as a heavily modified water body for land drainage[12]. As of 2018, the water body had an overall status of moderate, as a result of the status of quality elements including ammonia, dissolved oxygen and phosphate. The reasons for these failures to reach good status have been attributed to activities including water level management, diffuse source runoff from agricultural land and intermittent sewage discharge[13]. Details of the WFD elements is provided in **Error! Reference source not found.**.

Table 2 Summary of WFD status for Broadway Reen – source to R Severn Estuary

Macrophytes and phytobenthos combined	
Diatoms	
Hydromorphological Supporting Elements	

The mitigation measures assessment also notes several measures that are required in order to reach good status. These primarily focus on the management of the water levels and vegetation in the reens, with specific measures such as managing invasive species, vegetation control, installing fish passes and re-opening culverts.

5.2 Groundwater

The site is underlain by the 'SE Valleys Southern Devonian Old Red Sandstone & Triassic Mercia Mudstone' (GB40902G201500) groundwater WFD body**Error! Bookmark not defined.**. As of 2015, the water body has an overall status of good.

Published geology indicates the site to be underlain by Tidal Flat Deposits typically comprising clay and silt with beds of peat overlying glacial till, sand and gravel. This in turn rests on either Mercia Mudstone or St Maughan's Group mudstone. Ground investigations have shown the depth of clay and silt and peat to

[11] Natural England: MAGIC Map. SSSIs in Wales map.
[12] Natural Resources Wales: Water Watch Wales.
[13] Natural Resources Wales – WFD Cycle 2, Reasons for Not Achieving Good dataset.

vary between 3m and 7m underlain by up to 5m of sand and gravel, where present[14,15].

NRW aquifer designation classifies the superficial deposits as unproductive, with the bedrock classified as a secondary aquifer. It is anticipated that groundwater is mainly contained within the gravel layers at the interface between the bedrock and superficial deposits.

Table 3 Summary of WFD groundwater body status for SE Valleys Southern Devonian Old Red Sandstone & Triassic Mercia Mudstone

5.3 Protected Sites

As stated in Section **Error! Reference source not found.**, the proposed d evelopment sits within the Gwent Levels – St Brides SSSI. The Severn Estuary is located 1.1km south east of the works at the closest point. This estuary has Ramsar, SSSI, SAC and SPA designations with the primary designations relating to tidal rivers, estuaries, mud flats, sand flats and lagoons (including saltwork basins).

[14] Cardiff Parkway Development Ltd, Cardiff Parkway, Geotechnical Desk study, Arup, December 2017
[15] Cardiff Parkway ltd, Cardiff Parkway, Geotechnical Desk Study, ref. 252199-ARP-REP-EGE-000001, PO2, May 2017

6 Screening

6.1 Proposed Development Components

Activities that may result in an impact on WFD quality elements may take place during construction and/or operation of the proposed development. Table 4 details the expected activities, whether they have been screened in/out of further assessment, along with an explanation for the screening decision.

Table 4: Screening of proposed activities against WFD objectives

Proposed Activity	Screen In/Out	Explanation
Construction Activities		
Construction activities in or near a watercourse (e.g. construction of culverts or realignment of watercourses)	Out	**Potential impact(s):** All construction works will take place within the Broadway Reen catchment. Impacts from construction activities which may pose a risk to WFD quality elements include: • Sediment mobilisation from site runoff and working in the watercourse; • Accidental spillage of pollutants (e.g. fuel leakage from storage or plant); • Disturbance of fish due to the use of percussive equipment; and • Release of concrete contaminated waters to a watercourse. These may result in the deterioration in water and habitat quality in watercourses, with subsequent impacts upon aquatic species. **Mitigation measure(s):** It is assumed that the contractor (yet to be appointed) will be familiar with typical methods for working within or near watercourses. The risk of sediment mobilisation and/or accidental spillage are present at all construction sites and it is assumed that the contractor will be experienced in the implementation of best practice working practices (e.g. Guidance for Pollution Prevention 5: Work and maintenance in or near water) suitable to minimise the risks posed by these activities to the water environment. Such practices include ensuring that: • uncovered soil is exposed for a minimal period before vegetation is re-established to minimise sediment runoff; • suitable measures (e.g. sedimats, silt fencing, bubble curtains) are installed when working in or along watercourses to contain any disturbed sediment.

		• concrete pouring takes place in the dry and suitable measures are in place to contain, treat or remove any contaminated waters. • all operatives are trained in what to do in the event of an accidental spillage and that suitable equipment is kept on site to contain any spill should it occur. • refuelling takes place away from watercourses, that all plant and equipment is regularly checked and maintained to prevent leaks and that biodegradable fluids are used wherever possible. **Outcome:** Provided the mitigation measures above are implemented, construction activities pose a minimal risk to the water environment with any potential impacts only lasting for a short period of time enabling a rapid recovery in the quality of the water environment. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
General earthworks, including excavation required for the connecting the reen at location between Greenlane Reen and the flood storage area south of the railway	Out	**Potential Impact(s)** Sources of potential pollutants to groundwater quality include accidental spills (e.g. fuel from vehicle/plant), silt laden waters from excavation activities or from water contaminated during specific activities, such as concrete pouring/washing. Potential pathways for these pollutants include direct infiltration at source or in the case of spillages, infiltrate from the surface water features during periods of low flows. **Mitigation** It is considered that standard practice mitigation measures and working practices included within the CEMP including those identified above would significantly reduce potential impacts on groundwater quality within the underlying unproductive strata. **Outcome** Provided the mitigation measures detailed within the CEMP are implemented, these activities pose a minimal risk to the underlying WFD groundwater body. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
Installation of piling and band drains	Out	**Potential Impact(s)** Dewatering to enable piling activities for the construction building foundations and to installing band drains which increase the rate of ground consolidation have the potential to temporarily modify groundwater levels and flows, potentially creating new pollution pathways to the underlying secondary aquifer or causing detriment to features (e.g. groundwater-supported surface water features) reliant on groundwater resource. **Outcome:** This activity is screened out of the assessment as significant excavations that could alter groundwater levels are not required for the proposed development. The installation of band drains is required to increase the rate of ground consolidation. During this process the water released from the ground is likely to flow towards the ground surface and therefore downward migration is considered unlikely. Impacts from piling during construction are likely to be temporary and localised.

Operational Activities		
Discharge of surface water via SuDS to the wider water environment	Out	**Potential impact(s):** Surface water drainage across the site has the potential to create a pollution pathway for contaminants (e.g. runoff from a car park) to enter the wider water environment. **Mitigation** SAB consent is being sought from Cardiff Council which includes the incorporation of Sustainable Drainage Systems (SuDS). The drainage strategy for the proposed development describes how surface water run-off will pass through a sequence of SuDS features where possible. Such features would include dry ponds, wet ponds, swales and bioretention basins, which would remove the pollutants that may be generated from each component to an acceptable level, in line with the 'Simple Index Approach' which is the recognised method of assessing water quality within the Welsh Governments Statutory Standards for SuDS. **Outcome** Following the implementation of SuDS, there are not expected to be permanent impacts on the status or future potential of WFD quality elements. This activity is therefore screened out for further assessment.
Discharge of foul water generated on site to the water environment or the existing sewage network	Out	**Potential impact(s):** Foul water drainage across the site has the potential to create a pollution pathway for contaminants to enter the wider water environment. **Mitigation** The site would seek to connect to the wider foul drainage network, operated by Dwr Cymru Welsh Water. A foul water drainage strategy has been developed for the site. This will follow relevant guidelines which will ensure pollutants from the sewerage do not enter the wider water environment. **Outcome** Following the relevant constraints, this activity is anticipated to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
Accidental spillage of pollutants (e.g. fuel spillage following a road traffic collision)	Out	**Potential Impact(s):** The proposed uses of the site are for a new railway station, park and ride and business park. It is assumed that fuels or chemicals would not be stored onsite as a result of these uses and therefore there is an extremely low risk of an accidental spillage occurring on the site. Vehicles may be sources of accidental spills as a result of fuel leaks in car parks and development roads and present a source of potential pollutants to surface water quality. Spills could run-off into surface water features presenting a pollution pathway. Trains may be sources of accidental spills as a result of fuel leaks on train tracks and present a source of potential pollutants to surface water quality. **Mitigation**

		It is considered that the introduction of the treatment train of SuDS features would remove pollutants that enter surface waters from roads to an acceptable level. Spills released onto the tracks would be collected in the track drainage designed by Network Rail in accordance with Network Rail standards NR/L2/CIV/005 and is considered sufficient to manage accidental spills preventing surface water quality from being adversely affected. Upon detailed design, Cardiff Council would be consulted to determine whether further mitigation would be required. **Outcome** Provided the above mitigation measures are implemented, this activity is anticipated to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
Raising land within the development site resulting in the loss of watercourses	In	**Potential impact(s):** In order to meet TAN15 requirements, land would be raised to enable the development, resulting in the direct loss of a total length of 4.43km of ditches and grips. The potential WFD impacts relating to this activity would be to biological quality elements due to the loss of habitat area and hydro morphological quality elements due to the change in morphology and alteration in drainage flows. **Mitigation** The proposed development has been designed to result in no modification of primary reens (Faendre Reen, Green Lane Reen, Ty Ffynnon Reen), except where highway and pedestrian/cycle crossings are proposed. The reens would be retained in their existing form, with development offset boundaries as per NRW guidance. A compensation area with new channels will be provided for the ditches lost in the development area. **Outcome** Due to the direct loss of reens, further assessment of potential WFD impacts and suitability of the compensation area is required.
New in-channel or floodplain structures (e.g. new culverts for access roads or flood bunds)	In	**Potential impact(s):** New watercourse crossings would be required to establish pedestrian and vehicular access and rationalise the development area of the site. Impacts to WFD elements could result from modification of reens and the introduction of culverts, outfalls and flow control structures including sluices and attenuation ponds. **Mitigation** There is no mitigation suitable or feasible to alleviate the impacts identified. **Outcome** This activity is therefore screened in to further assessment.
Operation of new outflows	Out	**Potential impact(s):** Risk of scour surrounding the outfall structure and/or as a result of flow from the outfall causing an increase in turbidity and changes to the flow regime of the waterbodies.

		Mitigation measure(s): The following mitigation measures will be incorporated in the design and construction of these structures to minimise any impacts upon geomorphology: • Headwall structures would be set back from or constructed flush with channel banks to minimise the likelihood of local erosion or bank habitat loss; • Where scour protection at the base or sides of an outfall is considered necessary, bioengineering solutions such as the use of vegetation or rock would be preferred over hard revetment; • The design and construction supervision of these mitigation measures would be overseen by a qualified geomorphologist. **Outcome:** Following these measures, the risk of scour and subsequent impacts upon geomorphology are considered unlikely. No permanent impacts on the status or future potential of WFD quality elements are expected as a result of these activities.
Ground lowering	Out	**Potential impact(s):** The area of ground lowering for the flood compensation area on the west of the proposed development has the potential to create a pollution pathway to groundwater. **Outcome:** The area of ground lowering will be within the unproductive strata and would therefore not provide a pathway for effect, with no potential impact on the groundwater quality of the underlying secondary A aquifer. No permanent impacts on the status or future potential of WFD quality elements are expected as a result of these activities.

6.2 Zone of influence

The screening of the proposed development components has noted activities that have the potential to impact upon quality elements of WFD surface water and groundwater bodies. The following WFD waterbodies are deemed to be within the potential zone of influence of the proposed development:

- Broadway Reen – source to R Severn Estuary (GB109056073370) river WFD water body; and
- SE Valleys Southern Devonian Old Red Sandstone & Triassic Mercia Mudstone (GB40902G201500) groundwater WFD body.

7 Scoping

The scope of the detailed assessment is based upon the activities identified as potentially posing a risk to WFD quality elements in the screening assessment. The study area extends to the waterbodies within the zone of influence.

Based on the screening assessment, the affected waterbody is the Broadway Reen – source to R Severn Estuary WFD water body. The quality elements that are potentially at risk from the proposed activity and need further detailed assessment include hydro morphological and potentially ecological.

8 Assessment

The assessment of construction and operational effects has been informed by the findings of the following detailed assessments:

- ES Chapter 7 - Biodiversity
- Cardiff Hendre Lakes Habitat Regulations Assessment (HRA)

8.1 Raising land within the development site resulting in the loss of watercourses

The reen system within the planning boundary is a designated feature of the Gwent Levels – Rumney and Peterstone SSSI and are known to support a large population of European eel[16]. The reens are assigned a national ecological value within ES Chapter 7 - Biodiversity.

The development plateaux and hardstanding will result in the removal of 4.43km of existing unnamed reens, ditches and field grips as part of land raising to create development plateaux's. This will include the loss of 2.72km of the wet reen

[16] CVJV/AAR. (2015). Aquatic Environment Baseline Study - M4 Corridor around Newport - Environmental Statement Volume 3:

network; comprising 2.57km of wet Secondary Reens and 154m of wet ditches (the remaining were recorded as dry or field grips).

To mitigate for this impact, 3.72km of new reens will be formed to replace the 2.72km of wet reen lost as a result of the proposed development on a 'like for like' basis or improved. This amounts to a 37% net gain in wet reens. These reens will have a 3m wide base with 1 in 1 slopes and a 1m wide shelf just above water level on the south-facing side (or both sides space permitting) to ensure no reduction in the extent (area, volume or length) of the freshwater ecosystem. Construction of the proposed development will be phased such that, replacement reens will be created before the dewatering and loss of existing reens occurs. Interconnectivity will be maintained as existing to ensure that the management of water levels is unaffected, as will connectivity with the Severn Estuary to maintain fish passage for sea-going migrants.

The reen banks will be undisturbed with a 1 to 2m edge of vegetation. The reens themselves will not be shaded by hedgerows or woodland planting, and as such would provide enhanced opportunities for growth of aquatic macrophytes compared to some of the reens which they would replace. This is considered beneficial for all fish species as it provides refuge/cover.

Further details of replacement reen design are provided within ES Chapter 7 – Biodiversity - Embedded mitigation.

Following replacement as agreed with NRW, no permanent impacts on the status or future potential of WFD quality elements are expected as a result of these activities.

8.2 New in-channel or floodplain structures

The activities that would have an impact on WFD hydro morphological elements include:

- Introduction of culverts or bridges for the proposed development access routes crossing over Faendre Reen, Green Lane Branch, Greenlane, Ty-Ffynnon and Railway Reen;
- Widening of Greenlane Reen between Cobol Road / Heol Las junction down to the field access from Heol Las located north of the gas pressure reduction station, located near the south eastern corner of the site;
- Introduction of sluice gates, non-return valves or unidirectional culverts along Railway Reen and Greenlane Reen.

8.2.1 Culverts or bridges

Culverts have the potential to reduce habitat availability and connectivity and alter sediment transport through scour or deposition. To mitigate this impact, the detailed design would follow CIRIA C786 Culvert, screen and outfall manual so they don't impair the passage of fish.

Increased shading resulting from culverts has the potential to affect macrophytes within the affected watercourses. However, due to the limited length of affected watercourse, this impact is unlikely to impact on a waterbody scale. The replacement reens will not be shaded by hedgerows or woodland planting, and as such would provide enhanced opportunities for growth of aquatic macrophytes compared to some of the reens which they would replace. Therefore, there is a potential beneficial impact macrophytes on a waterbody scale.

Given the mitigation proposed, no permanent impacts on the status or future potential of WFD quality elements are expected as a result of these activities.

8.2.2 Widening

Greenlane Reen requires widening to minimise the impact on the water environment to provide greater storage and increase conveyance of flow. The widening of the watercourse has the potential to impact on the flow rate and therefore hydromorphological supporting elements, with subsequent effects upon biological quality elements (e.g. fish invertebrates, macrophytes), of the WFD water body.

The following design principles would be implemented during the detailed design of the proposed development to mitigate the effects of the widening upon WFD quality elements:

- the detailed design of the widened watercourse would provide naturalistic features of an equivalent or greater value to that of the existing watercourse;
- the new bank will be profiled to replicate existing conditions; and
- the detailed design should be overseen by an experienced fluvial geomorphologist.

As such, the effect on the reen habitats is considered to reduce over the first 3 years as the re-provisioned reens aquatic and marginal flora and invertebrate assemblage start to establish. Pending detailed design information, this may have a beneficial long-term impact if there is sufficient water to support a larger reen.

Given the mitigation proposed, no permanent impacts on the status or future potential of WFD quality elements are expected as a result of these activities.

8.2.3 Sluice gates, non-return valves or unidirectional culverts

The two penstock or tilting weir penstocks that are proposed along Railway and Greenlane Reens are designed to operate as a 1 in 200 year flood defence and would only likely be shut for a period of 3-5 days at a time, to protect against a severe coastal flood event. The structures are therefore considered to be temporary barriers to fish migration when operated as designed, with a negligible effect on fish passage. Nevertheless, the structures will comply with the Eels (England and Wales) Regulations 2009, with eel passes installed as required.

Given the mitigation proposed, this activity is not anticipated to result in any significant effects upon the quality elements of any of the WFD surface waterbodies where outfalls are proposed as part of the proposed development.

9 Enhancement

9.1 River Basin Management Plan (RMBP) objectives

The study area is located within the Severn River Basin District and therefore the objectives from both the Severn RBMP are relevant to the proposed development.

The river basin district seeks to comply with the objectives of the WFD. Measures, and standards to help achieve the WFD objectives detailed within the Severn RBMP include:

- controlling new physical modifications;
- managing pollution from waste water;
- managing pollution from towns, cities and transport;
- changes to natural flow and levels of water;
- managing invasive non-native species;
- managing pollution from rural areas; and
- managing pollution from minewaters.

9.2 Opportunities for enhancement

The proposed development provides opportunities for enhancement to support the objectives of the WFD and Severn RBMPs. The objectives that will be supported by proposed development include:

- controlling new physical modifications;
- changes to natural flow and levels of water; and
- managing invasive non-native species.

With the exception of where highway and pedestrian/cycle crossings are proposed, the proposed development will avoid modification of primary reens (Fendre Reen, Green Lane Reen, Ty Ffynnon Reen), with development offset boundaries as per NRW guidance.

Interconnectivity between reens will be maintained as existing to ensure that the management of water levels is unaffected, as will connectivity with the Severn Estuary to maintain fish passage for sea-going migrants. Within the created reens will be a 4m wide connecting reen, south of the railway, which will convey flows from Greenlane Reen into the flood compensation area.

Care will be taken during the draining down of waterbodies to adhere to the requirements of the Invasive Species Management Plan in relation to invasive aquatic plant species, as outlined in the outline CEMP. Reen monitoring will also inform the requirement for any removal of invasive species from watercourses; methods to be agreed with NRW. Where practicable and subject to NRW

approval, vegetative and dredged material from existing Secondary reens to be lost would be used to encourage colonisation of new reens and ditches by aquatic macrophytes. The benefits of translocating material to encourage colonisation in the newly created reens will be balanced with the biosecurity risk associated with spreading Schedule 9 INNS.

Through the CEMP (Appendix A2) the proposed development would seek to prevent the introduction or spread of invasive species as a result of construction activities.

10 Summary

It is considered that the activities related to the proposed development will not cause deterioration in the status of any WFD waterbodies or prevent them from achieving either ‘Good Ecological Status’ or ‘Good Ecological Potential’ by 2021 or 2027, provided that the mitigations measured described in Sections 6 and 8 are implemented. The delivery of this mitigation is secured by its inclusion within the Outline CEMP, which is a requirement of the EIA.

This assessment has been based on currently available WFD baseline data and design information for the proposed development. The assessment is considered a ‘live’ document and should be reviewed and updated at detailed design and construction, particularly if:

- NRW update or provide additional WFD baseline data for the relevant water bodies; and/or
- Significant changes to the nature, spatial extent, scale or construction methods of the proposed development are made.

The outcomes of this assessment and any future updates to the assessment should be shared and agreed with NRW (as the regulatory authority for the WFD in Wales) as part of the scoping process.