



South Wokingham Distributor Road - Spine Road and Western Gateway Phase 1

Detention Basin - Amenity Design

WMHP-TG-SRWG1-RP-HI-0507

Revision: P02

Date: 15/10/2024



Balfour Beatty

South Wokingham Distributor Road - Spine Road and Western Gateway Phase 1

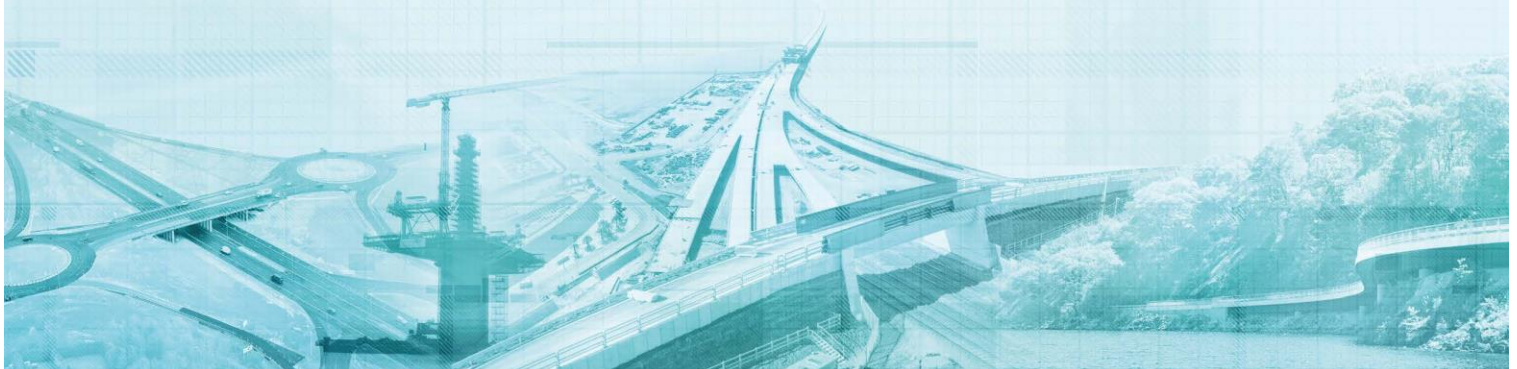
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1. Introduction

Planning application 192928 for the South Wokingham Distributor Road (SWDR) was consented in May 2021 with a number of associated planning conditions. Planning condition 12.c states the following requirement in relation to Sustainable Drainage Systems (SuDS) for highway drainage:

“detailed design of SuDS features in accordance with the SuDS Strategy, demonstrating how they will be integrated into the wider landscape, with attenuation basins having a natural shape and shallow profile (not requiring lifesaving equipment and fence barriers), allowing them to fulfil amenity, ecological and drainage functions”

Amenity is considered in this context to be an area provided to increase the passive enjoyment for residents by improving its quality or character. As opposed to providing multi-use space.

Part of the highway drainage is contained within the proposed Holme Park SANG which is subject to a separate planning application by another applicant, ref 191068. Through this it is subject to its own planning conditions to fully implement this feature as a SANG and amenity space. Natural England define SANG as:

“‘Suitable Accessible Natural Green Space’ (SANG) is the name given to green space...intended to provide mitigation for the potential impact of residential development...”

The construction of this feature is required as part of the South Wokingham Distributor Road to mitigate the removal of the existing surface water attenuation feature located in the land to the west of Easthampstead Road. The Holme Park attenuation basin will require construction and commissioning prior to the decommissioning of the existing basin and construction of the highway alignment through this area. It should be noted that the design of this feature has been completed by others and will not be implemented as part of a SANG and amenity space until the wider development has been completed by the developer consortium. Its temporary state between construction and adoption by the developer consortium will be considered within this report. The following planning conditions for SWDR application 192928 relate to the Holme Park SANG:

- 12. i) q) demonstration that the layout that is consistent with and does not prejudice the proposed use of the land as a SANG (under application 191068 or any application that supersedes it);
- 23. ii) maintenance access to all drainage features including those within the SANG and other public open space, consistent with the highway design and landscaping details pursuant to conditions 6 & 12;

This document sets out to determine the recommendations for amenity design of SuDS features and evaluate the SuDS features in the SWDR and Holme Park SANG designs as submitted for planning against these recommendations.

This document also provides a risk assessment and additional features that will be included within the design to comply with the recommendations and permit discharge of the planning condition.

2. Review of requirements against planning design

2.1. Design Requirements

The SuDS features in question on SWDR that are to be considered for amenity design are detention basins in drainage catchments 2, 3, 4, 7. The Holme Park SANG planning application 191068 will also be evaluated although the design of this feature was completed by others and planning conditions prevent any layout changes.

Chapter 22 of the CIRIA SuDS Manual 2015 sets out the design recommendations for detention basins as well as further recommendations for designing for amenity. These are summarised as follows:

1. Maximum water depth of 2m in the most extreme design events.
2. Vegetated side slopes no steeper than 1:3.
3. Appropriate access for maintenance.
4. Prevented access to inlet or outlet pipes, via either grates/grilles or fences. Grilles are only required for pipe greater than 350mm diameter.

In addition to the design recommendations set out in CIRIA SuDS Manual 2015 the Wokingham Sustainable Drainage System Strategy sets out the following recommendation:

5. Information should be provided to inform residents and the public of the SuDS design and features on the site.

In addition to the main recommendations set out in the documents referenced above, several additional considerations are set out in the CIRIA SuDS Manual 2015, these are as follows:

Additional considerations:

- Interpretation boards explaining that the space is part of a drainage system.
- Area enhancement through the inclusion of footpaths or cycleways.
- Life saving equipment if deemed necessary via risk assessment.

2.2. Assessment of Features

The table below illustrates how features within the design submitted for planning reflects the design recommendations for each drainage catchment by colouring as follows:

- red (does not include measures for the recommendation),
- green (fully comply with recommendations).

Where the catchment is coloured red the design submitted for planning does not include any measures therefore new measures are needed.

The table below also includes comments to explain what additional features are required to fully meet the requirement.

Recommendation	SuDS feature				
	Catchment 2 Basin	Catchment 3 Basin	Catchment 4 Basin	Catchment 7 Basin	Holme Park SANG
1	Maximum Water Depth: 1.0m	Maximum Water Depth: 1.1m	Maximum Water Depth: 1.0m	Maximum Water Depth: 0.5 m	Maximum Water Depth: 2.78 m
2	Maximum Side Slope: 1:3	Maximum Side Slope: 1:3	Maximum Side Slope: 1:3	Maximum Side Slope: 1:3	Maximum Side Slope: 1:3
3	Maintenance Access Provided: 1:3 slopes allow unaided movement for maintenance personnel	Maintenance Access Provided: 1:3 slopes allow unaided movement for maintenance personnel	Maintenance Access Provided: 1:3 slopes allow unaided movement for maintenance personnel	Maintenance Access Provided: 1:3 slopes allow unaided movement for maintenance personnel	Maintenance Access Provided: 1:3 slopes allow unaided movement for maintenance personnel
4	Protection of drainage assets: Grilles on headwalls	Protection of drainage assets: All pipe diameters less than 350mm, no additional feature required	Protection of drainage assets: Grilles on headwalls	Protection of drainage assets: All pipe diameters less than 350mm, no additional feature required	Protection of drainage assets: Grilles on headwalls
5	Information for Residents: A communication strategy for informing residents has not been provided.	Information for Residents: A communication strategy for informing residents has not been provided.	Information for Residents: A communication strategy for informing residents has not been provided.	Information for Residents: A communication strategy for informing residents has not been provided.	Information for Residents: A communication strategy for informing residents has not been provided.

2.3. Recommendations

Following on from the assessment of each basin the following actions are to be included in the detailed design of each feature to ensure that they function fully as amenity spaces as required in the planning conditions, meeting the set-out requirements.

1. A communication strategy needs to be established with WBC to inform residents of the purpose of the features and the potential hazards associated with them. This strategy shall include information boards, placed in convenient locations at each of the features.

The boards should contain the following information (CIRIA SuDS Manual, 2015):

- Site Name.

- Emergency Instruction “Dial 999 in an emergency”.
 - Main hazards and prohibition symbols and supplementary text.
 - Details of site supervision services and contact details.
 - Location and postcode.
 - Site map showing, rescue equipment, first aid and supervisory help, telephones.
 - Organisational logos.
2. A risk assessment needs to be completed to establish if lifesaving equipment is required at any of the feature locations.

3. Design activities and changes to meet requirements

3.1. Headwalls/Grilles

All inlets and outlets of diameter greater than 350mm to be fitted with grilles to prevent access.

3.2. Communication/Information boards

A communication board will be located at each basin to set out the information stated in the previous section. TQ 0402 was raised on the 17/08/2021 to WBC to determine the information that is to be displayed.

3.3. Risk Assessment

A risk assessment was undertaken to determine the requirement of life saving equipment in the location of each of the SuDS features.

Lifesaving equipment is not desired by WBC within the planning conditions which states:

"...attenuation basins having a natural shape and shallow profile (not requiring lifesaving equipment and fence barriers)..."

Lifesaving equipment is required in locations where the water conditions and location suggest it is needed to mitigate the risk of drowning. To evaluate the risk of drowning several factors need to be considered (CIRIA SuDS Manual, 2015):

- Access to Water.
- Fencing.
- Siting.
- Water body and flood exceedance or conveyance design.
- Signs.

3.3.1. Access to the Water

Where water is accessible the following considerations need to be considered in accordance with the CIRIA SuDS Manual to provide a safe environment:

- A dry bench, or level surface, prior to the water feature. This allows an individual to access the surroundings.
- All slopes not greater than 1:3.
- A level wet bench, just below the normal water level, for people who have entered the waterbody.
- Clear indication of the water edge.

In the instance of the detention basins on this scheme:

- A dry bench is provided in the form of a minimum 3m wide access track around the basin edge.

- All side slopes are to be 1:3, maximum.
- A level wet bench is provided at Catchment 2 and 4 basins, 1.0m wide and 0.4m below the maximum water line. This is discussed further in the fencing section below.
- Indication of the edge of the feature is provided by the hard standing access track around the perimeter or along the accessible edge.

3.3.2. Fencing

Fencing is not desirable to the planning authority as this creates a barrier to amenity use. Fencing can lead to greater risk of drowning, due to obstructing visual observance of a water body and preventing help during an emergency (CIRIA SuDS Manual, 2015).

Fencing is generally required at water features when there is either a hazard presented with access to the water, or where it is considered likely for children to have access to the water unsupervised.

Regarding access to the water, this risk is managed, as discussed in the previous section.

Regarding the catchment 2 and 4 basins these are in areas where children may be present and have access to the water. Catchment 2 is near to the Tesco Superstore and Catchment 4 is located close to a play area/park. Due to the planning requirement not to include fences in the design of these features, further mitigation is provided through the inclusion of a 1.0m wide bench in the side slope of the basin, 0.4m below the maximum water line. The inclusion of this is to provide a level surface to reduce the likelihood of a child from entering the full depth of these features, if they are full at the time of an incident.

3.3.3. Siting

Siting refers to the location of the basin regarding the wider development. By locating the basin in an area accessible, close to local roads, footpaths, houses and other amenities, the natural surveillance from surrounding properties and residents will reduce risks and improve amenity benefits.

All basins, other than the Holme Park SANG basin, on the scheme are near the proposed South Wokingham Distributor Road (SWDR), below the level of the neighbouring shared use pedestrian facility. They are also located centrally to the wider development, close to properties and other amenities.

The Holme Park SANG at the time of the construction of the SWDR will be located in an area of isolation and not particularly visible to areas of the wider development.

3.3.4. Water body and flood exceedance or conveyance design

According to CIRIA SuDS Manual, 2015, where SuDS features are close to dwellings they should only have a maximum normal or permanent water depth of 0.6m. Water should also not be conveyed through the feature at more than 0.5m/s. This is so that if someone inadvertently enters the water that they can remain standing.

With the proposed features, as they are detention basins, they do not have a normal or permanent water depth so this is therefore less than the maximum of 0.6m. The return periods for storm events in which the basin will reach a depth of over 0.6m are listed below:

	Return Period to Exceed 0.6m attenuated depth
Catchment 2	1 in 20 year
Catchment 3	1 in 40 year
Catchment 4	1 in 20 year
Catchment 7	n/a
Holme Park SANG Basin	1 in 5 year

It is also noted that maximum water depths should not exceed a maximum depth of 1.5m, without further benching or safety features included in the design to help mitigate the risk.

The Catchment basins featured have an expected maximum water depth of less than 1.5m, as displayed in the Table in Section 2 of this report.

The below table demonstrates the velocity through the catchment basins at the maximum rate per return period, these are calculated from taking the maximum discharge rate into the basin (l/s) and dividing by the cross-sectional area of flow, based on the maximum attenuated depth for the same storm and a typical cross section profile of the basin.

	1 in 1 year	1 in 30 year	1 in 100 year + 40%CC
Catchment 2	0.06 m/s	0.08 m/s	0.07 m/s
Catchment 3	0.06 m/s	0.07 m/s	0.06 m/s
Catchment 4	0.05 m/s	0.05 m/s	0.04 m/s
Catchment 7	0.07 m/s	0.08 m/s	0.07 m/s

These values do not account for peak flows at inlet and outlet points which will be higher.

Based on the above, the risk proposed by the water body and conveyance through it provides a manageable level of risk, with no further control measures required.

As shown the Holme Park SANG's water depth increases above 0.6m relatively frequently, with depths rising up to 2.78m in the worst design events, this is due to the constraints of the site, limiting the footprint for this feature and therefore increasing the depth of attenuated water. At full water depth someone within the basin would no longer be able to stand. This along with the high inflow rates from both the diverted water course and the Thames Water culvert of 1.6 m³/s (1600l/s) and 1.97 m³/s (1970l/s) respectively pose a considerable risk as a water body and extra mitigation should be put in place.

3.3.5. Signage

Signage in the public area/amenity space can be an effective way of educating users about the health and safety risk presented by a SuDS feature.

As mentioned in section 4 above it is intended that public information boards will be placed at convenient locations around the basin to identify the risks associated with the feature as well as identify a protocol to follow in the event of an emergency.

3.3.6. Evaluating the Risk

Following the above evaluation of the features on this scheme against the various criteria that need to be considered when evaluating the risk of drowning, the SuDS feature designs have been assessed against the matrix below to determine the level of risk presented by the features.

		Consequence				
		Insignificant	Minor	Moderate	Major	Extreme
Likelihood		No injury or health effects	Minor injury or health effects	Injury but not life threatening Some ill health effects	Serious injury Dangerous near miss Serious ill health	Serious injury or death Serious life-threatening disease
Almost certain (frequent)	Is expected to occur/recur frequently or within a short period of time (most weeks or months)	M	M	H	E	E
Likely (probable)	Will probably occur/recur in most circumstances (several times a year)	L	M	H	H	E
Possible (occasional)	Possibly will occur/recur occasionally (once every few years)	L	M	M	H	H
Unlikely (uncommon)	Uncommon might occur/recur at some time in the future	L	L	M	M	H
Rare (remote)	Unlikely to occur/recur May only happen in exceptional circumstances	L	L	L	L	M

Figure 1: Risk Assessment Matrix (CIRIA SuDS Manual 2015)

3.3.7. Evaluation of Catchment 2 Basin

The risk of drowning at the catchment 2 basin is considered Rare, with the basin meeting the criteria set out to mitigate risk in the guidance as well as not being a permanently wet feature. The consequence for drowning is still however considered to be Major or Extreme, as serious injury or death could be a consequence of the risk posed. This therefore gives a Low Risk (L) or Medium Risk (M) outcome.

Medium risk (M)	Design stage – review if it is practical and reasonable to change design to reduce level of risk Management stage – review options to see if there are practical and reasonable options to reduce risk
Low risk (L)	Design stage – acceptable – no changes required Management stage – no response needed to reduce the level of risk, continue to review on regular basis

Figure 2: Risk Key (CIRIA SuDS Manual 2015)

As stated for Medium Risk (M), the design should be reviewed to determine if design changes are practical or reasonable to reduce the level of risk. However, as the evaluation shows the detention basins are designed in such a way that they reduce the likelihood of the risk as far as reasonably practicable, design changes would therefore not reduce the likelihood further. The Medium Risk score is solely an outcome of the severity of the consequence of drowning. Subject to removing the feature entirely and losing the added community benefit of the amenity space alongside it, this level of risk cannot be reduced further.

3.3.8. Evaluation of Catchment 3 Basin

The risk of drowning at the catchment 3 basin is considered Rare, with the basin meeting the criteria set out to mitigate risk in the guidance, as well as not being a permanently wet feature. The consequence for drowning is still however considered to be Major or Extreme, as serious injury or death could be a consequence of the risk posed. This therefore gives a Low Risk (L) or Medium Risk (M) outcome.

Medium risk (M)	Design stage – review if it is practical and reasonable to change design to reduce level of risk Management stage – review options to see if there are practical and reasonable options to reduce risk
Low risk (L)	Design stage – acceptable – no changes required Management stage – no response needed to reduce the level of risk, continue to review on regular basis

Figure 3: Risk Key (CIRIA SuDS Manual 2015)

As stated for Medium Risk (M), the design should be reviewed to determine if design changes are practical or reasonable to reduce the level of risk. However, as the evaluation shows the detention basins are designed in such a way that they reduce the likelihood of the risk as far as reasonably practicable, design changes would therefore not reduce the likelihood further. The Medium Risk score is solely an outcome of the severity of the consequence of drowning. Subject to removing the feature entirely and losing the added community benefit of the amenity space alongside it, this level of risk cannot be reduced further.

3.3.9. Evaluation of Catchment 4 Basin

The risk of drowning at the catchment 4 basin is considered Rare, with the basin meeting the criteria set out to mitigate risk in the guidance, as well as not being a permanently wet feature. The consequence for drowning is still however considered to be Major or Extreme, as serious injury or death could be a consequence of the risk posed. This therefore gives a Low Risk (L) or Medium Risk (M) outcome.

Medium risk (M)	Design stage – review if it is practical and reasonable to change design to reduce level of risk Management stage – review options to see if there are practical and reasonable options to reduce risk
Low risk (L)	Design stage – acceptable – no changes required Management stage – no response needed to reduce the level of risk, continue to review on regular basis

Figure 4: Risk Key (CIRIA SuDS Manual 2015)

As stated for Medium Risk (M), the design should be reviewed to determine if design changes are practical or reasonable to reduce the level of risk. However, as the evaluation shows the detention basins are designed in such a way that they reduce the likelihood of the risk as far as reasonably practicable, design changes would therefore not reduce the likelihood further. The Medium Risk score is solely an outcome of the severity of the consequence of drowning. Subject to removing the feature entirely and losing the added community benefit of the amenity space alongside it, this level of risk cannot be reduced further.

3.3.10. Evaluation of Catchment 7 Basin

The risk of drowning at the catchment 7 basin is considered Rare, with the basin meeting the criteria set out to mitigate risk in the guidance as well as not being a permanent water feature. The consequence for drowning is still however considered to be Major or Extreme, as serious injury or death could be a consequence of the risk posed. This therefore gives a Low Risk (L) or Medium Risk (M) outcome.

Medium risk (M)	Design stage – review if it is practical and reasonable to change design to reduce level of risk Management stage – review options to see if there are practical and reasonable options to reduce risk
Low risk (L)	Design stage – acceptable – no changes required Management stage – no response needed to reduce the level of risk, continue to review on regular basis

Figure 5: Risk Key (CIRIA SuDS Manual 2015)

As stated for Medium Risk (M), the design should be reviewed to determine if design changes are practical or reasonable to reduce the level of risk. However, as the evaluation shows the detention basins are designed in such a way that they reduce the likelihood of the risk as far as reasonably practicable, design changes would therefore not reduce the likelihood further. The Medium Risk score is solely an outcome of the severity of the consequence of drowning. Subject to removing the feature entirely and losing the added community benefit of the amenity space alongside it, this level of risk cannot be reduced further.

3.3.11. Evaluation of the Holme Park SANG basin

The risk of drowning at the Holme Park SANG basin is considered Unlikely to Possible, due to the basin exceeding the recommended maximum water depth of 1.5m and the high inflow rates, deeming the waterbody a high risk environment. The consequence of drowning is considered to be Major or Extreme, as serious injury or death could be a consequence of the risk posed. This therefore gives a Medium Risk (M) or High Risk (H) outcome.

High risk (H)	Design stage – not acceptable – design must be changed Management stage – attention and response needed to reduce the level of risk
Medium risk (M)	Design stage – review if it is practical and reasonable to change design to reduce level of risk Management stage – review options to see if there are practical and reasonable options to reduce risk

Figure 6: Risk Key (CIRIA SuDS Manual 2015)

As stated for Medium Risk (M), the design should be reviewed to determine if design changes are practical or reasonable to reduce the level of risk. For High Risk (H) the design is not acceptable.

In its form as delivered as part of the SWDR as an attenuation basin and not as an amenity space, and with the significant associated risk, the public should be deterred from using this space. It is therefore proposed that temporary fencing and warning signs be provided around this feature, until such time that it is handed over to the developer consortium. At such time the developer should undertake an independent risk assessment to evaluate the risk, considering the risks identified in this report, and implement the required mitigation measures to allow this space to be used as a SANG and amenity space.

Temporary access arrangements for planned and regular maintenance will need to be agreed between the overseeing organisation and contractor for the period between construction and adoption by the developer consortium. It is understood that the Holme Park area will be handed over from the SWDR contractor to the Consortium immediately upon completion of the SWDR construction.

In the instance that the consortium do not adopt Holme Park SANG at the end of construction, then the management of the feature shall be passed to Wokingham Borough Council as the local authority until it is adopted. If the area is never adopted by the developer consortium then the temporary fencing should be replaced by permanent fencing.

4. Conclusion

The four SWDR highway drainage attenuations basins, Catchment 2, 3, 4 and 7 basins, with the inclusion of grates on inlets and outlets of diameter greater than 350mm and public information boards meet the recommendations set out in the relevant guidance documents regarding safe design of amenity without requiring the inclusion of fences of life saving equipment as set out in the planning requirements.

The Holme Park SANG provides the required drainage function to offset the loss of existing attenuation to the west of Easthampstead Road, however the basin cannot be recommended as amenity space, in its temporary form, due to the significant risks posed by the potentially deep and fast moving water, until such time that the developer consortium have established and implemented the required mitigation for its long term use. It is therefore recommended in this instance that temporary fencing and warning signs are provided around the basin to mitigate the risk and reduce the likelihood of an incident occurring. The fencing will not prevent access completely, however its presence along with warning signage will convey the message to SANG the public that this area is not to be entered. Fencing will also provide a restraint in the event of accidental slips/trips around the basin perimeter.