8.3.6 Surface Water SuDS and flood mitigation

The surface water drainage scheme for the CWMMC has been designed to incorporate Sustainable Drainage Systems (SuDS), reflecting a comprehensive and environmentally conscious approach to managing surface water. These SuDS are integrated into the corridor's design, featuring green roadside elements that serve dual purposes: bioretention and water quality treatment. These green infrastructure features channel surface water to strategically placed attenuation basins, which are engineered to regulate and manage water flows, ensuring that the discharge from the proposed works aligns with greenfield equivalent rates. This design not only mitigates potential flooding but also maintains water quality, reflecting best practices in sustainable urban drainage.

The SuDS design strategy for the CWMMC has been carefully tailored to address the varying characteristics of the corridor's landscape. In the semi-urban northern and central sections, the design balances the need for effective drainage with the preservation of the area's semi-natural character. This is achieved by integrating SuDS with the surrounding green infrastructure and landscape, enhancing both the functionality and aesthetic appeal of the corridor. In contrast, the more urbanized southern section of the CWMMC features a SuDS design that is more attuned to the higher density and impervious surfaces typical of urban environments. Here, the SuDS are closely integrated with urban green spaces, providing essential stormwater management while contributing to the urban landscape.

A critical component of the corridor scheme is the inclusion of flood compensation measures, particularly for the northern section, which partially intersects with the flood extents of Ifield Brook. These measures are designed to offset any potential increase in flood risk, ensuring that the development does not exacerbate flooding in the surrounding areas. The flood compensation strategy has been carefully coordinated with the overall SuDS approach, creating a robust system that manages both everyday water flows and extreme weather events.

The SuDS design for the Primary Street follows the principles established for the southern section of the CWMMC, aligning with the urban context of the area. The design incorporates linear green features, such as bio-retention areas and rain gardens, which are integrated into the broader landscape scheme. These features are not only functional but also enhance the visual appeal of the urban environment. They are designed to collect and treat surface water runoff, reducing pollutants before the water is channeled to detention basins and underground attenuation storage. These systems ensure that surface water is discharged at rates equivalent to those of natural greenfield sites, minimizing the impact on downstream watercourses and maintaining the ecological balance.

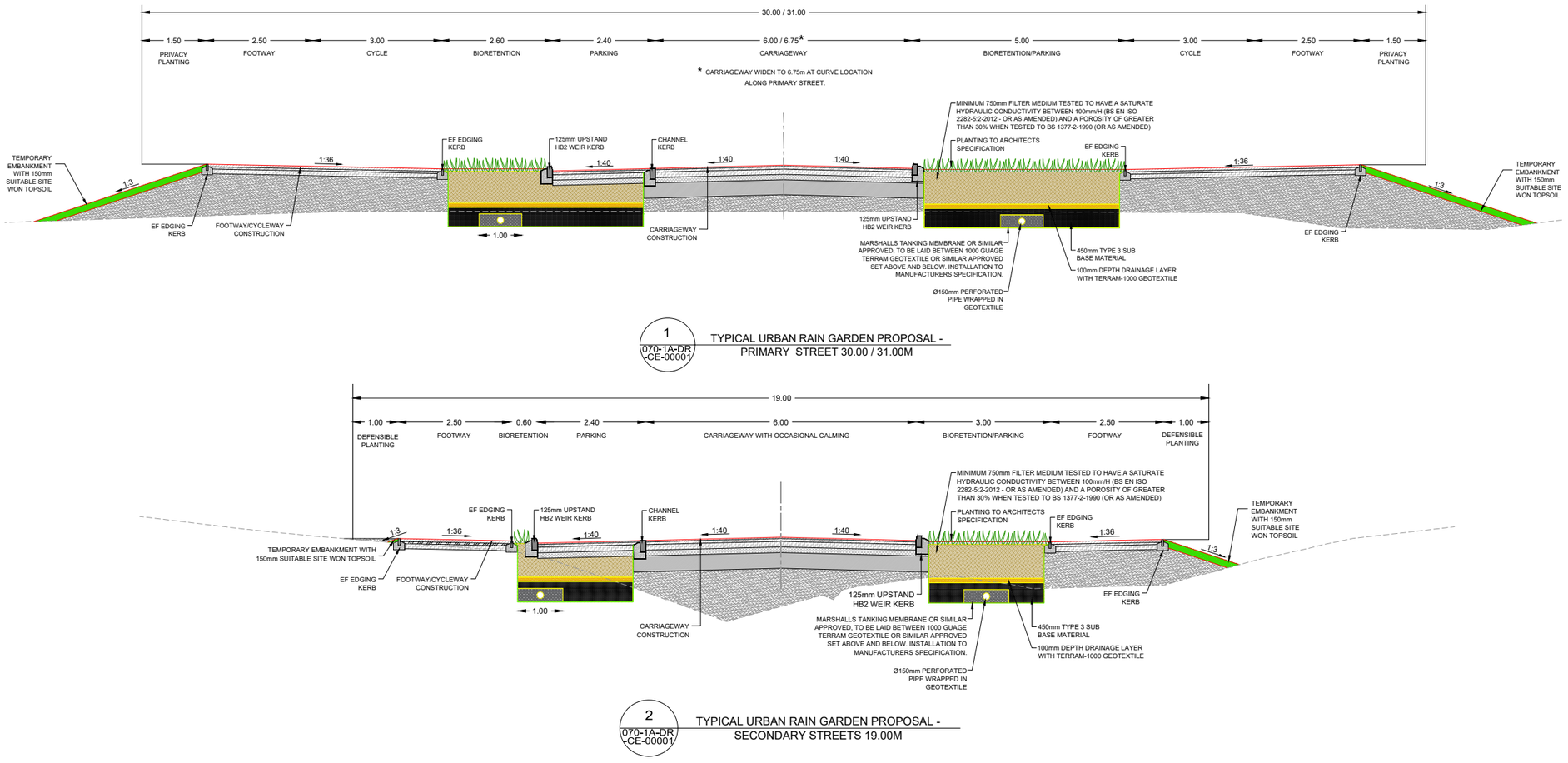
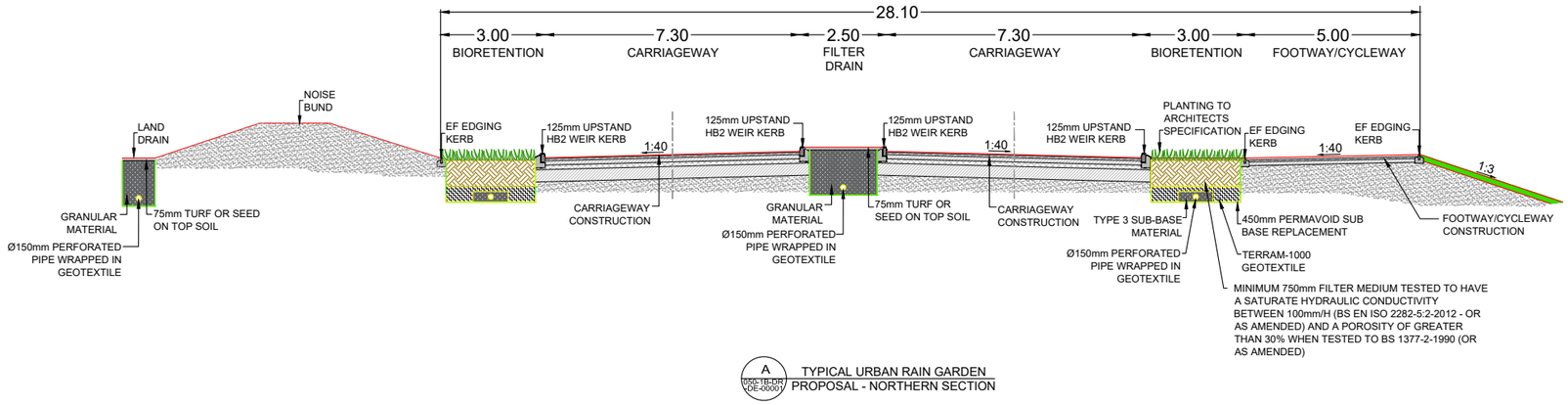
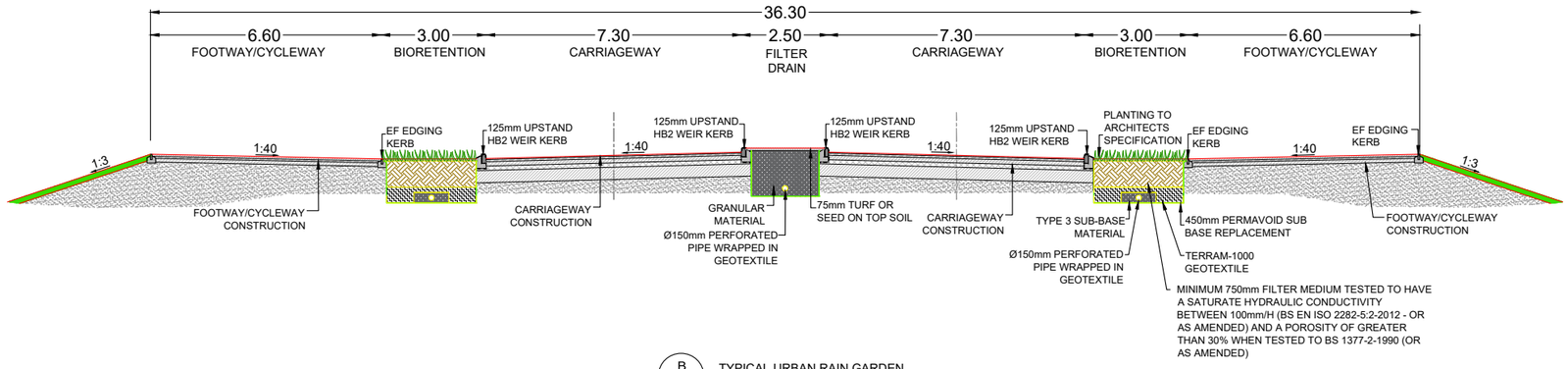


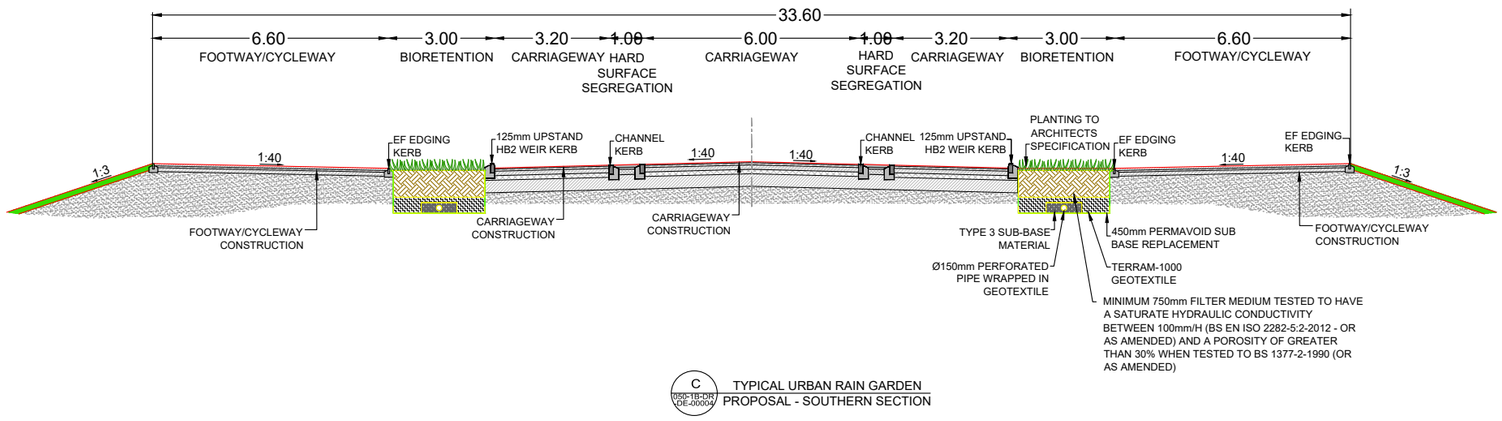
Figure 08-16: Typical Urban Rain Garden Proposals - Primary and Secondary Streets



A (050-TB-DR-DE-00001) TYPICAL URBAN RAIN GARDEN PROPOSAL - NORTHERN SECTION



B (050-TB-DR-DE-00003) TYPICAL URBAN RAIN GARDEN PROPOSAL - CENTRAL SECTION



C (050-TB-DR-DE-00004) TYPICAL URBAN RAIN GARDEN PROPOSAL - SOUTHERN SECTION

Figure 08-17: Typical Urban Rain Garden Proposals Sections

8.3.7 Landscaping Works (including interface with Flood Mitigation Features, Ecological Enhancements and Noise Mitigation)

The proposed landscaping embeds the CWMMC into the existing landscape and its landscape features and promotes sustainable design approaches e.g. through the implementation of SUDs and native planting. The network of existing vegetation and land use provides a rural park landscape setting for the eastern part of the CWMMC, which changes gradually to a more urban setting in the western part of the CWMMC. The proposed softscape responses to these varying landscape characters through a natural design approach with native species, scattered trees, woodland parcels, wildflower meadows to maintain the openness of the area in the east and a more formal design approach in the west where future buildings will line the streets and boulevard tree planting is proposed to provide human scale and enhanced urban environment within the development. The Primary and Secondary Streets are lined with street trees and a mix of natural and ornamental rain gardens. Refer to section 8.6 for more detail.

Landscaping of key design features

Flood Mitigation Features

Detention basins for flood mitigation are integrated into the landscape through wildflower meadow seeding suitable for wetlands. The selected mix will provide species suitable for the varying moisture conditions inside the basins, on its embankments and around the edges. Refer to section 8.8.2 for more details on detention basins.

Ecological Enhancements

Various ecological mitigation was integrated into the landscape proposals. These include badger tunnels and fencing, bat hop over, and hibernacula for amphibians and reptiles. The selection of species and habitat creation was a key consideration to achieve a Biodiversity Net Gain. Refer to section 8.7 for more detail.

Noise Mitigation

A grass bund for noise mitigation is proposed to the north of the CWMMC. The shape of the bund flows into the existing landscape to minimise visual impact and to maintain the open character of this particular area. Proposed clumps of trees, scattered single trees and small woodland parcels on and around the noise bunding create filtered views of the bunding and road from receptors in the vicinity. Refer to LVIA report (16200007949_1_Ch11_LVIA Chapter 11: Landscape and Visual Impact, Volume 1: Main Environmental Statement)

A noise model for the Proposed Development and the study area was developed using CadnaA® version 2023, a proprietary noise modelling software. The software implements the standard noise prediction methodology detailed in ISO 9613 Part 2:1996. This model was used to assess the likely effects of noise sources within the study area. The software utilises standard acoustic principles in conjunction with approved prediction methodologies and is a tried and tested method for accurately predicting and assessing the impact of noise from a variety of sources. Existing topography was obtained from open-source LiDAR data.

The completed development stage model accounts for the cumulative road traffic flow data provided for 2041 with the completed development and cumulative schemes in place. Assessment of the magnitude of noise level change and associated significance of effects has been determined to LA 111: Noise and Vibration (DMRB -Design Manual for Roads and Bridges).

The plan below identifies the location of existing and future sensitive receptors. Please note the receptors are not single locations but group together all relevant receptors in that general location. Those with a high degree of sensitivity in the immediate vicinity of the CWMMC are:

- R1 Bonnets Lane / Ifield Green dwellings
- R2 Trivelles Gatwick Hotel (identified as a receptor as per requirements in LA 111)
- R3 The Druids, Ifield Wood
- R5 Tweed Lane Dwellings

In response to the draft EIA assessment and in conjunction with developing the design of the CWMMC, different noise mitigation options were considered. Combinations of noise bunds and/or fences have been explored, as these have been deemed to be most appropriate and effective to control changes in noise levels at the nearest noise sensitive receptors.

Given the significant visual impact of a noise barrier fence, initial work considered a noise bund set some 10m away from the carriageway edge, profiled so as far as possible to blend into the landscape of the country park. However, modelling demonstrated that this approach did not sufficiently reduce noise levels at the receptor locations. A noise fence/ bund is most effective when it is close to the noise source.

Options therefore focussed on noise/fence layouts immediately adjacent to the CWMMC carriageway and considered constraints such as the public footpath, the scheduled ancient monument, and woodland areas to be retained. The four options considered were:

- Noise bund 3.5m in height with a gap in a fence to accommodate the public footpath
- Noise bund 3.5m in height with an overlap in a fence to accommodate the public footpath
- Noise fence 2.5m high with a gap in the fence to accommodate the public footpath
- Noise fence 2.5m high with an overlap in the fence to accommodate the public footpath

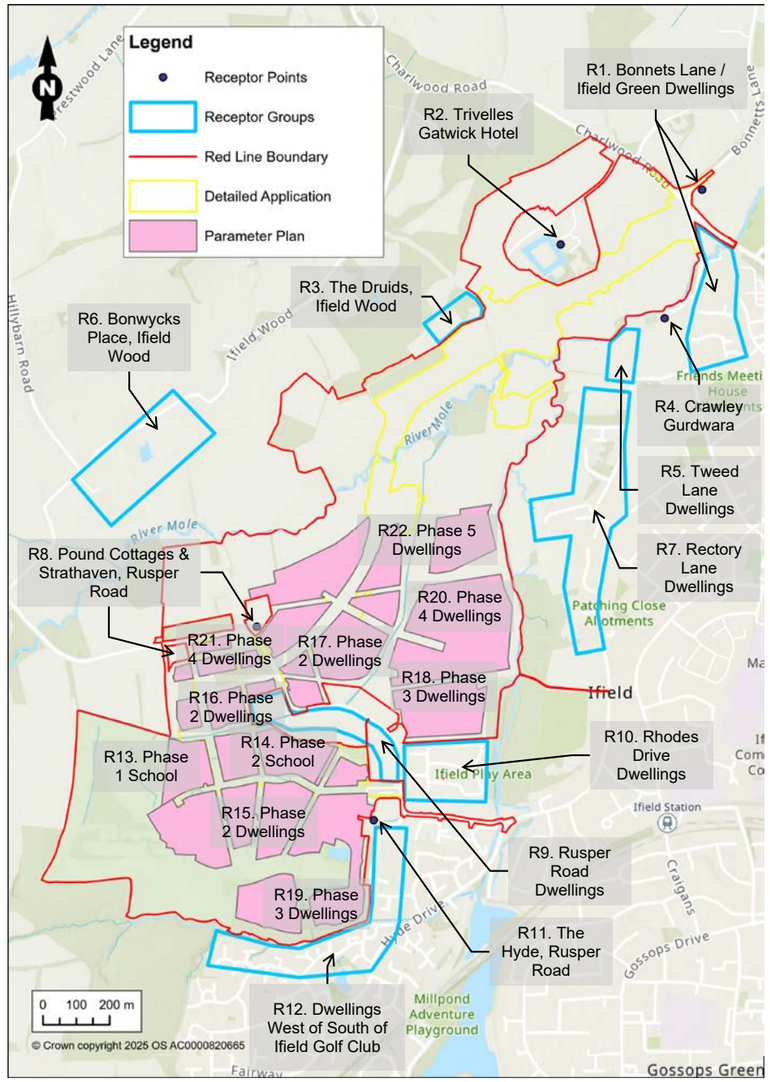


Figure 08-18: Receptors within proximity of the Proposal (note: Outdated RLB)

Noise modelling showed that all four options were effective as mitigation and would all reduce road traffic noise levels to below the LOAEL at each noise sensitive receptor, not causing any significant noise effects from road traffic noise in EIA terms. However, those options with a gap to accommodate the public footpath result in noise increases that are within 1dB of the LOAEL. The options with the overlap result in the lowest noise levels at the most exposed façade of the Druids – these are considered the best options purely in terms of noise mitigation performance, setting aside all other variables, that all four options reduce traffic noise levels to below the LOAEL, although some provide slightly better acoustic mitigation performance than others, the options were considered for other potential environmental effects to provide a comparison of the relative merits of each option.

The effects on other receptors have been considered in the table 3. This table assumes that the Proposed Development is in place, including the CWMMC, and considers additional effects specifically associated with each mitigation option. Each option has not been subject to full detailed impact assessment. However, based on the understanding of the site the relative effects on each of the receptors stated below have been considered.

Figure 08-19: Bund with barrier overlap

Figure 08-20: Bund with gap in barrier

Impact	Noise Bund 3.5m with gap	Noise Bund 3.5m with overlap	Noise fence 2.5m with gap	Noise fence 2.5m with overlap
Openness of Landscape and Visual Impact	This option would introduce a bund into a relatively flat landscape, reducing the openness of the landscape within the areas proposed as country park. Views from the north would be foreshortened with only the top half of existing vegetation along Ifield Brook visible beyond, however receptors would benefit from all but the tallest vehicles being screened in views. From The Druids, which would have the most open views of the bund, and the adjacent property to the west, the fence and gap would be visible, the gap allowing views through to the road and passing traffic. Mitigation planting could be used to filter these views of the gap and the fence. From ground level, the hedgerows along the boundaries at Glenbervie and the existing mature trees around the Ifield Court Hotel and the Scheduled Monument mean views are predominantly screened. Where there are filtered views, the grassed bund would blend into the background and would screen almost all vehicles on the road. Where space allows, the north side of the bund should grade gently into the existing ground levels to reduce the visual prominence of the bund.	This option would have the same effects as the other bund option, the only difference being the overlap in fence along the PRoW. This overlap would screen views of traffic from The Druids and the adjacent property to the west. Mitigation planting could be used to filter views of the fence. Where space allows, the north side of the bund should grade gently into the existing ground levels to reduce the visual prominence of the bund.	This option would introduce a linear solid boundary for approx. 700m, reducing the openness within the areas proposed as country park. The fence would screen views to the south however would also screen cars in views. Mitigation planting could be used to soften the effect of the fence, although care should be taken to create a solid strip of planting which would contrast with the surrounding country park. From The Druids, which would have the most open views of the fence, and the adjacent property to the west, the gap for the PROW would be visible, the gap allowing views through to the road and passing traffic. Mitigation planting could be used to filter these views of the gap and the fence. From ground level, the hedgerows along the boundaries at Glenbervie and the existing mature trees around the Ifield Court Hotel and the Scheduled Monument mean views are predominantly screened. Where there are filtered views, the fence would be out of character, although would screen cars on the road.	This option would have the same effects as the other fence option, the only difference being the overlap in fence along the PRoW. This overlap would screen views of traffic from The Druids and the adjacent property to the west. Mitigation planting could be used to soften the effect of the fence, although care should be taken to create a solid strip of planting which would contrast with the surrounding country park.
Heritage and SAM	Both options result in adverse effects on heritage receptors and setting, however the bund options are considered to be less adverse than fence options. The bund options present more challenges when considering potential groundwater effects on the moated scheduled monument, although these can be overcome by appropriate construction methods.	Both options result in adverse effects on heritage receptors and setting, however the bund options are considered to be less adverse than fence options. The bund options present more challenges when considering potential groundwater effects on the moated scheduled monument, although these can be overcome by appropriate construction methods	Both options result in adverse effects on heritage receptors and setting, however the fence options are considered to be more adverse than bund options. The fence options present fewer challenges when considering potential groundwater effects on the moated scheduled monument.	Both options result in adverse effects on heritage receptors and setting, however the fence options are considered to be more adverse than bund options. The fence options present fewer challenges when considering potential groundwater effects on the moated scheduled monument.
BNG, Ecology, Mature and Veteran Trees	The creation of the bund requires more land take (than the fence) and is more adverse in terms of habitat loss and hence BNG (although this can be addressed as part of wider BNG considerations for the Site. Other than BNG comments above, each option doesn't result in significantly differing effects on ecological receptors. The bund options have slightly more adverse effects on hedgerow H329. Each option has the same effects on mature and veteran trees.	The creation of the bund requires more land take (than the fence) and is more adverse in terms of habitat loss and hence BNG (although this can be addressed as part of wider BNG considerations for the Site. Other than BNG comments above, each option doesn't result in significantly differing effects on ecological receptors. The bund options have slightly more adverse effects on hedgerow H329. Each option has the same effects on mature and veteran trees.	The creation of the fence requires less land take (than the bund) and is less adverse in terms of habitat loss and hence BNG. Other than BNG comments above, each option doesn't result in significantly differing effects on ecological receptors. The fence options have slightly less adverse effects on hedgerow H329. Each option has the same effects on mature and veteran trees.	The creation of the fence requires less land take (than the bund) and is less adverse in terms of habitat loss and hence BNG. Other than BNG comments above, each option doesn't result in significantly differing effects on ecological receptors. The fence options have slightly less adverse effects on hedgerow H329. Each option has the same effects on mature and veteran trees.

Country Park Design and User Experience (crime and graffiti)	A bund option would be less vulnerable to damage or vandalism. Sections of fence, particularly along PROW section may still be vulnerable and planting could be used to discourage damage. The gap in the fence allows for some natural surveillance to the road crossing and the park beyond. A gap is preferable to an overlap in terms of legibility, and safety along the PRoW	A bund option would be less vulnerable to damage or vandalism. Sections of fence, particularly along PROW section may still be vulnerable and planting could be used to discourage damage. The overlap could potentially be a safety issue, allowing places for people hide and reducing natural surveillance.	A fence option may be more vulnerable to damage or vandalism. Planting could be used in more vulnerable areas to discourage damage. The gap in the fence allows for some natural surveillance to the road crossing and the park beyond	A fence option may be more vulnerable to damage or vandalism. Planting could be used in more vulnerable areas to discourage damage. The overlap could potentially be a safety issue, allowing places for people hide and reducing natural surveillance.
PROW	For users of the PROW travelling south, the section of fence within the bund gap in the fence would provide legibility in route, users being able to see where the road crossing location and the view to the park beyond. Similarly, for those travelling north, the PROW to the north of the road would be visible beyond the road.	For users of the PROW travelling south, the gap in the fence would not be visible due to the overlap, giving no indication of the park or road beyond. Similarly, for those travelling north. The fence within the bund may help to indicate the location of the gap in the fence. The overlap potentially gives a sense of foreboding, the user not being able to see beyond or if a person is round the corner.	For users of the PROW travelling south, the gap in the fence would provide legibility in route, users being able to see where the road crossing location and the view to the park beyond. Similarly, for those travelling north, the PROW to the north of the road would be visible beyond the road.	For users of the PROW travelling south, the gap in the fence would not be visible due to the overlap, giving no indication of the park or road beyond. Similarly, for those travelling north. The overlap potentially gives a sense of foreboding, the user not being able to see beyond or if a person is round the corner.
Adoptability, Maintenance and Management	Both options introduce further maintenance requirements to the Local Highway Authority however for the bund option this would only consist of infrequent visual inspections of the slope in a similar way to that of a highway embankment and maintenance of the soft landscape within the footprint of the bund. As the bund is a standard solution there should be no real implication in terms of adoptability.	Both options introduce further maintenance requirements to the Local Highway Authority however for the bund option this would only consist of infrequent visual inspections of the slope in a similar way to that of a highway embankment and maintenance of the soft landscape within the footprint of the bund. As the bund is a standard solution there should be no real implication in terms of adoptability.	Both options introduce further maintenance requirements to the Local Highway Authority however for the fence options the maintenance requirements are significantly more as the fence would be classed as a structure and therefore require regular inspections of the posts, foundations and panels. In addition to this the fence has a design life of typically 25 years and therefore at this point would be required to be completely replaced. As the fence is a standard solution there should be no real implications in terms of adoptability.	Both options introduce further maintenance requirements to the Local Highway Authority however for the fence options the maintenance requirements are significantly more as the fence would be classed as a structure and therefore require regular inspections of the posts, foundations and panels. In addition to this the fence has a design life of 25 years and therefore at this point would be required to be completely replaced. As the fence is a standard solution there should be no real implications in terms of adoptability

Table 3 - Noise impact assesment of different receptors

The preferred option of the 3.5m noise bund with gap has been developed to reduce impact on the area and to be as in keeping with the country park character as possible. The design of the bund includes a 1 in 3 slope on the carriageway side, to get the required height of 3.5m as close as possible to the highway. The 1 in 3 slope provides the necessary noise mitigation whilst providing a natural looking slope, to minimise encroachment of the bund into the wider open area.

On the other side of the bund i.e. adjacent to the third-party properties and Scheduled Monument, the slope has been slackened to 1 in 4 in places to tie into existing ground levels, varying the crest and toe, making it visually less engineered and a more natural appearance within the wider landscape. There is opportunity as the design progresses to further slacken the slope, although a balance is to be struck between the shallowness of the slope and the amount of fill required to create the bund. In addition to this, the planting proposals located adjacent to the bund, provide visual screening in places to third party properties, whilst continuing the meadow habitats surrounding the CWMMC. Parcels of native woodland planting are proposed on the bund, softening its appearance and making it less visually engineered.

8.3.8 Ecology

Given the range of Important Ecological Features (IEFs) across the proposed Development site, a range of mitigation and compensation measures are required. In brief, these comprise:

- The retention of large woody material from felled trees into log piles and consideration of retaining standing dead wood and 'planting' dead tree stumps as dead wood features.
- Creation of areas of bare, sandy ground within landscape planting.
- Invertebrate boxes or 'bee hotels' and bee bricks are proposed.
- Hibernaculum.
- Sensitive lighting design following guidance and principles provided in the BCT and Institution of Lighting Professionals (ILP) Guidance Note 08/18 'Bats and artificial lighting in the UK.
- Clear span bridge structure at the River Mole.
- Bat hop-overs.
- Dry pipe/ mammal crossing point.
- Artificial badger sett.
- Replacement ponds in the event of the traditional great crested newt licensing route to be followed.

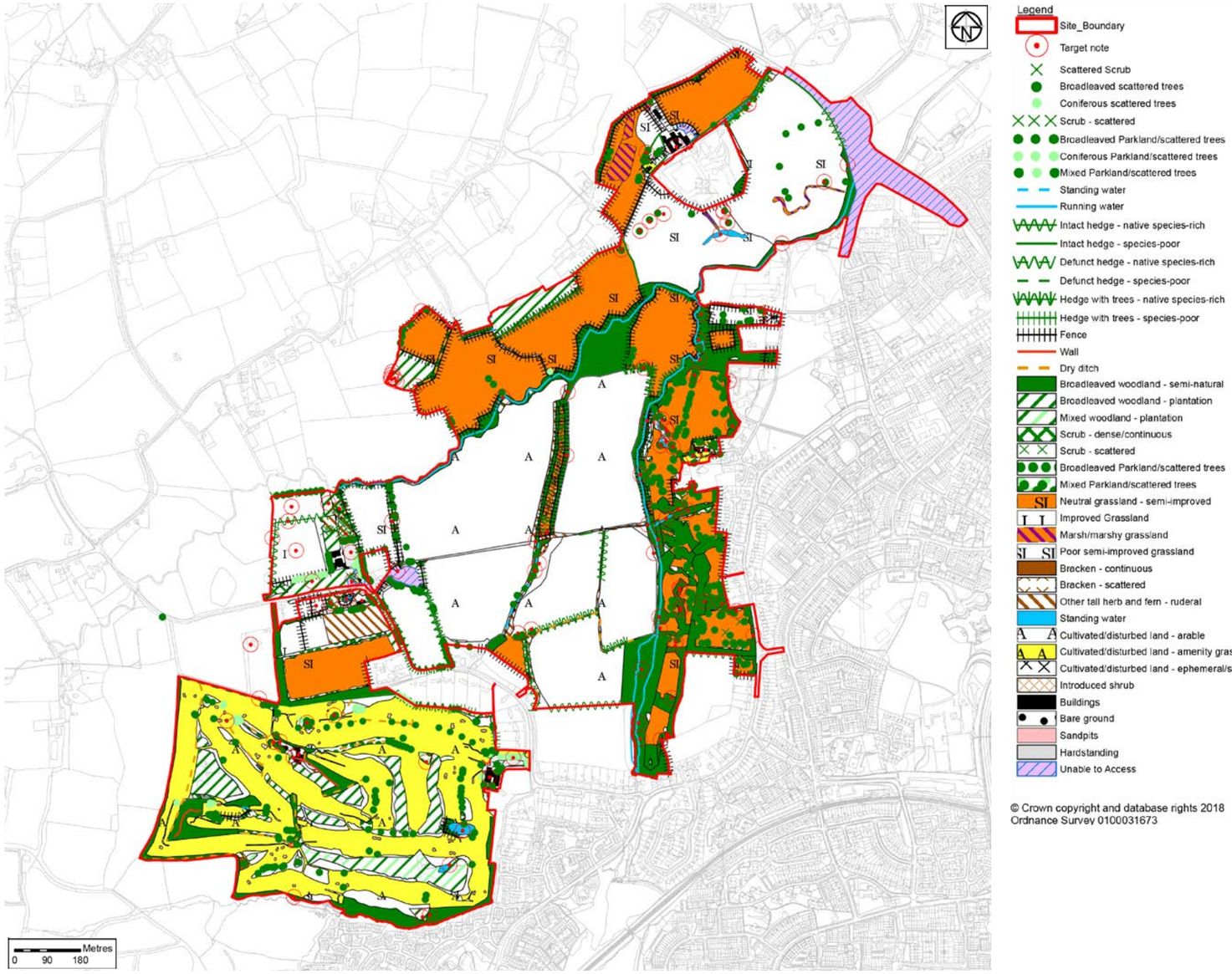


Figure 08-21: *Phase 1 Habitat Plan, Drawing 10051123-ARC-260-ZZ-DR-HE-00001*