



SPaTS2 T0549 – National Highways 2030 Water Quality Programme

PRELIMINARY DESIGN PLAYBOOK

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EXECUTIVE SUMMARY

The playbook has been developed to give an overview of the approach the Water Quality Technical Partners (TP) are taking to generate preliminary designs which aim to mitigate the risk of pollutants from highway surface water runoff from entering downstream watercourses.

The scope has been refined in discussion with other stakeholders and aligns with the National Highways Operations Directorate (OD) 3D governance process.

The playbook includes the site selection and scheme prioritisation processes developed by the TP for use within the current commission. It also summarises the design process and proposed design pathways for the development of the preliminary designs by the TP.

This revision of the playbook has been produced in the context of the work expected to be undertaken by the TP during the current commission which includes the FY25/26 period.

1

INTRODUCTION



1. INTRODUCTION

1.1. PROJECT CONTEXT

National Highways Environment Sustainability Strategy & Standards Group has commissioned a Technical Partner (TP) to provide a range of specialist technical and programme management support services to accelerate delivery of commitments made within its [2030 Water Quality Plan: Mitigating high risk outfalls and soakaways](#).

The key objectives of this project are:

1. Provision of project management function to support the delivery of the plan's commitments in Road Period 2 (2020-2025) and Road Period 3 (2025-2030).
2. Development of a preliminary designs for the water quality programme. Delivery of tranche 1 and 2 schemes in line with NH Operations governance for onward delivery by NH Operations.
3. Development of a long-term strategy and implementation plan to integrate the outputs of the Rapid Prioritisation Tool with the outputs from the validation and verification of the 1,236 into the RP3 Programme.
4. Provision of programme office function to support the delivery of the plan's commitments in Road Period 2 (2020-2025) and Road Period 3 (2025-2030).
5. Development of an inspection programme for 100 selected sites that have been validated, verified and through a Technical Quality Check (TQC) and their final risk status has changed from Cat A or B to Cat C, D or X.

1.2. PRELIMINARY DESIGN OBJECTIVES

The aim is to develop an end-to-end process for the preliminary design stages for surface water pollution mitigation schemes and produce an initial set of scheme designs following the proposed process.

The products and solutions created by the TP have been guided by the design principles given in Figure 1-1.



Figure 1-1 Design principles

PRELIMINARY DESIGN PROPOSED DOCUMENTS

Figure 1-2 shows the purpose and level of detail of the proposed suite of documents being produced to support the work expected to be undertaken by the TP during the current commission.

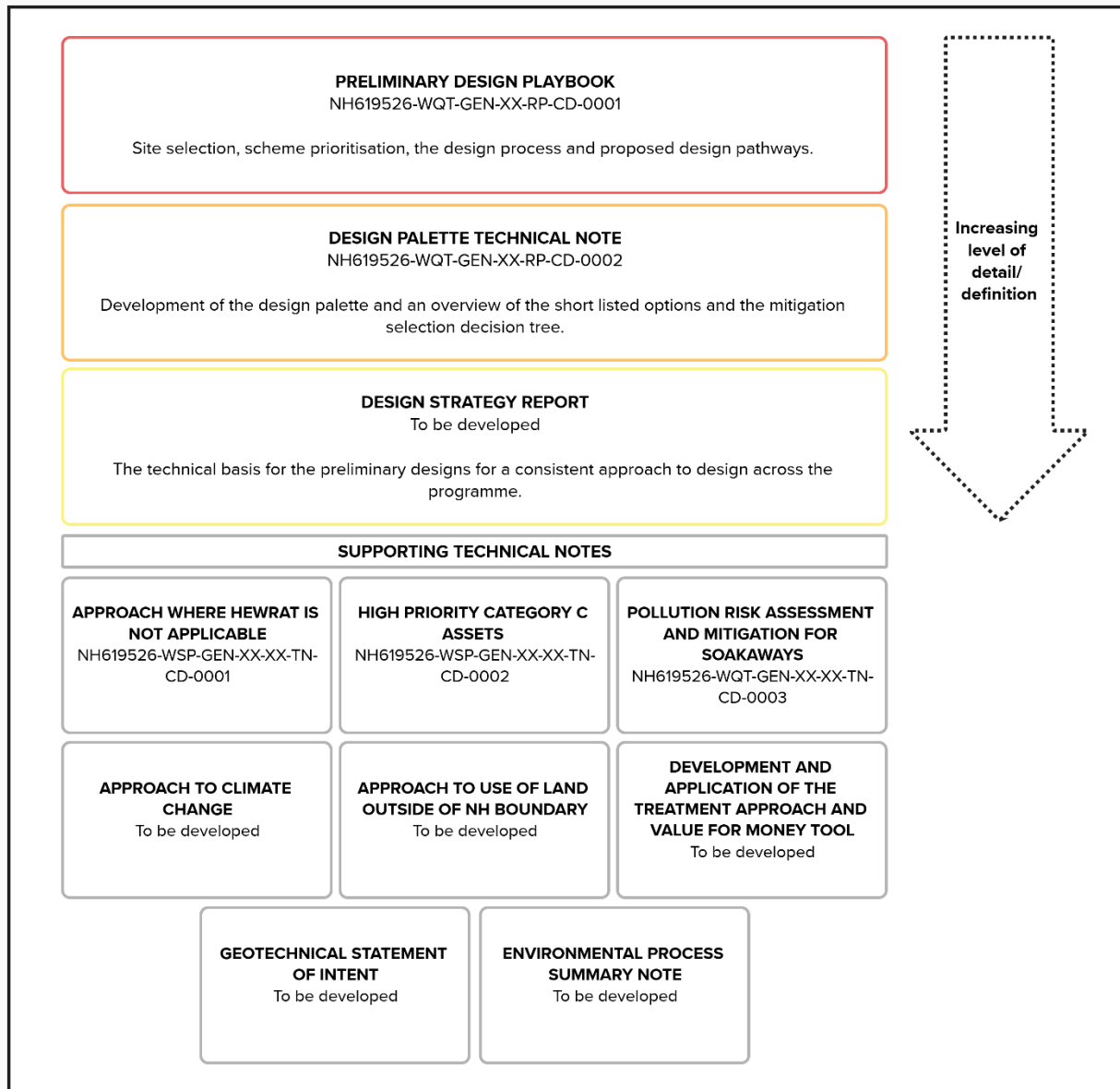


Figure 1-2 Preliminary design documents

1.3. PURPOSE OF THE DESIGN PLAYBOOK

- The playbook has been developed to give an overview of the approach the TP is taking to develop the preliminary designs and summarises the proposed process.
- The playbook is to be supported by supplementary documents, refer to Figure 1-2, which will provide further detail regarding the decision-making process and research undertaken.
- The playbook may be updated as the programme develops.
- This revision of the playbook has been produced in the context of the work expected to be undertaken by the TP during the current commission which includes the FY25/26 period.

2

OVERVIEW



2. OVERVIEW

2.1. SCOPE

The goal of the water quality programme is to develop and implement practical, cost-effective pollution mitigation solutions that deliver environmental benefits within existing funding constraints, prioritising investment in locations where the highest value can be achieved.

The scope for the preliminary designs has been developed using the National Highways (NH) Designated Funds governance process and the Operations Directorate (OD) 3D governance process. Table 1 provides a summary of the varying terminology used across governance processes, outlines the TP's interpretation of their alignment, and identifies the terminology adopted by the TP.

Table 1 Governance process terminology

TP adopted terminology	NH OD 3D Governance Stages	NH OD 3D Governance end of stage review	Designated Funds Environment Appraisal Tool
Stage 0 - Scheme Identification	Stage 0 - Scheme Identification	Stage Gate 1 review	Stage 1 – Concept/ Pre-feasibility
Stage 1 - Options Assessment	Stage 1 - Options Assessment	Stage Gate 2 review	Stage 2 – Feasibility and Preliminary Design
Stage 2 - Preliminary Design	Stage 2 - Preliminary Design	Stage Gate 3 review	Stage 2 – Feasibility and Preliminary Design

END-TO-END PROCESS

An idealised end-to-end process for the preliminary designs has been produced by the TP which details the proposed deliverables for each stage as well as the design pathways. An overview of the end-to-end process is included in Appendix A. The intention is that this process will be reviewed periodically as the programme progresses.

Lessons learnt from the preliminary design of initial “Tranche 1” schemes in FY24 have informed the preliminary design end-to-end process. In producing the end-to-end process, various stakeholders have been engaged including Safety, Engineering & Standards (SES) Environment, SES Drainage, NH OD 3D practitioners, representatives from the OD PM team and OD asset lead engineers as part of the Drainage Design Working Group (DDWG), and the Water Quality Working Group (WQWG).

2.2. STAKEHOLDER ENGAGEMENT

The WQWG consists of senior members of NH. They have delegated authority to govern the project and are responsible for allocation of funds to identified schemes. It is expected that the WQWG will approve, or delegate approval of all design and strategic decisions such as scheme clustering.

Representatives from the Department for Transport (DfT), the Environment Agency (EA), the Department for Environment, Food and Rural Affairs (Defra), the Chartered Institution of Water and Environmental Management (CIWEM) and Natural England are engaged through periodic roundtable discussions. The intention of these meetings is to ensure alignment between NH and other national bodies on appropriateness of process.

The Drainage Design Working Group (DDWG) has been established to inform and assure the approach for development and Design with Operations Directorate, National Highways on behalf of the WQWG, to ensure successful delivery. The DDWG will report into the WQWG, providing progress updates and escalating risks and issues for final decision making. It is also intended that the DDWG will review the proposed preferred options for extended sites, further detail on the design process is included in Section 4.

As part of the proposed integrated delivery model, a dedicated NH Interface Project Manager (IPM) will be allocated to each preliminary design. It is expected that the IPM will cover maintenance and operational input into the preliminary design as well as coordination of NH products as specified by the end-to-end process.

Consultation with OD Asset Leads, expected to include drainage, geotechnics and environmental, will align with the NH discipline specific process requirements.

Pre-application meetings for anticipated departures from standard will be held with the NH Safety, Engineering, and Standards (SES) teams if required. It should be noted that the application for departures from standard, if required, will be submitted during the detailed design phase.

Input from buildability advisors (ECI) and the detailed design supplier (EDI) is expected to be required during this commission and is planned to be provided by the OD supply chain. It is understood that a number of deliverables will be required to be produced by these contractors.

A number of surveys will likely be required during the preliminary design stage, these may include topographical survey, drainage CCTV survey, ground penetrating radar survey etc. It is planned that these will be provided by the OD supply chain and engagement through the IPM will be undertaken with specific contractors once appointed.

It is anticipated that consultation with the NH commercial and procurement team, the NH communications team, the NH equality, diversity and inclusion lead and a NH quantity surveyor will be required.

Table 2 below gives details of the indicative stakeholder activities. Additional engagement with the parties listed in this report or other interested parties, for example British Water, may be undertaken, as required, as the project progresses.

Table 2 Indicative stakeholder activities

Level	Engagement	Title	Frequency	Topic
Programme	Drainage Design Working Group	DDWG meeting	Monthly	Present Options Reports
Programme	Water Quality Working Group	Board Roundtable	Monthly	WQWG progress reporting
Scheme	OD Drainage asset lead (DLE)	OD asset lead engagement	Monthly per scheme	Review design proposals Understand current knowledge of the drainage networks/catchment areas which may not be on NH Geotechnical & Drainage Management Service (GDMS)
Scheme	OD Environment asset lead	OD asset lead engagement	Monthly per scheme & as required	Review environmental alert form/strategy
Scheme	OD & SES Geotechnical asset lead(s)	OD & SES asset lead engagement	Monthly per scheme & as required	Review geotechnical strategy/products
Scheme	SES Environment	Pre-application meeting	1 per extended site (partial treatment)	Review anticipated departures and discuss justification and likely requirements at detailed design stage
Scheme	SES (drainage, environment, highways if required)	Pre-application meeting	1 per scheme (if required)	Review anticipated departures and discuss justification and likely requirements at detailed design stage
Scheme	Buildability advisor / Detailed Design Supplier	Stakeholder Workshop (ECI/EDI workshop)	1 per contained site 2 per extended site	Scheme buildability
Scheme	Buildability advisor	ECI deliverables progress meeting	TBC	Scheme buildability
Scheme	Survey contractors	Site survey kick off meeting	1 per scheme	Site surveys

It is proposed to appoint a TP Design Integration Manager to ensure consistent development of the preliminary designs in line with the proposed process and to align the designs with localised requirements. This Design Integration Manager will oversee the development of a design guide and hold regular meetings with all design partners. A team structure and roles matrix has been produced with discipline specialists integrated into the design teams. It is proposed to hold quarterly review meetings to incorporate lessons learnt and confirm alignment across the partners.

2.3. DESIGNATED FUNDS FUNDING ARRANGEMENTS

Designated funds have been secured by the WQWG for the WQ Programme for the FY25/26 period, these funds are expected to include for TP scope as well as other non-TP roles such as OD support, survey delivery and the detailed design and construction of OD led schemes. The WQWG is expected to draw down further funds for future financial years from the Designated Funds pot available for the third Road Investment Strategy (RIS3). The TP is expecting to seek allocation of funds to schemes to allow for the next stages of delivery from the WQWG. This will involve the production of a funding application pack which is to be developed and agreed.

2.4. CONSTRUCTION DESIGN AND MANAGEMENT (CDM)

As principal designer, WSP Safety in Design lead will co-ordinate all health and safety input required to ensure the designs can be implemented, maintained, and dismantled keeping risks to health and safety as low as reasonably practical and that any residual risks are managed. Pre-construction information, health and safety files and design risk management records will be populated and maintained throughout the preliminary design process with periodic reviews by the Safety in Design team.

3

SITE SELECTION



3. SITE SELECTION

3.1. HIGH PRIORITY ASSET IDENTIFICATION

For this tranche of preliminary designs, high priority assets are classified as NH outfalls or soakaways which have been identified in the NH Water Quality Plan and are;

- Verified as having an overall risk status of A or B using the NH routine runoff and surface water quality assessment tool (HEWRAT) or the National Highway's Priority Soakaway Worksheet
- Verified as having an overall risk status of C and discharges to a relevant designated site, refer to the "SPaTS approach to addressing Cat C assets within or upstream of designated sites or other sensitive receptors" ref NH619526-WSP-GEN-XX-XX-TN-CD-0002.
- Verified sites where HEWRAT is not applicable, refer to "approach to outfalls discharging to surface water bodies where HEWRAT is not applicable" ref NH619526-WSP-GEN-XX-XX-TN-CD-0001.

High priority assets which have been technically assured by the TP Technical Quality Check (TQC) team will be assessed for progression into the preliminary design. This assessment will include a review of the environmental justification for inclusion and scheme clustering as detailed in Section 3.2.

3.2. SCHEME CLUSTERING

Individual high priority assets will be reviewed for the potential to combine multiple high priority assets into a single scheme for delivery. This will allow efficiencies to be realised and streamline the design and construction of the pollution mitigation solutions. It is proposed that the following groupings may be used to create a scheme which comprises of multiple high priority assets.

- Design requirement
- Maximum distance, e.g. high priority assets within 1km
- Road within OD Region
- Watercourse/ waterbody
- Failure mechanism
- Environmental Drivers

SCHEME OVERLAP

High priority assets which are within the extents of current or proposed Major Projects or OD schemes will be discussed prior to inclusion to avoid duplicating efforts. There is a possibility that the schemes/projects can be combined, this would require further review on a case-by-case basis. Similarly, the water quality schemes could be bundled with resolving flooding hotspots if funding is available.

3.3. SCHEME PRIORITY

To understand which schemes, have more precedence in design, the environmental drivers for each scheme were assessed. The following list details the environmental drivers, ranked in order of importance as identified by the TP.

The highest importance is placed on outfalls or soakaways within or hydraulically connected to internationally designated sites where the designation is related to surface water or groundwater, specifically;

- Wetlands of International Importance (RAMSAR), Special Areas of Conservation (SAC) and Special Protection Areas (SPA) within 1km and hydraulically connected downstream of the asset

This is followed by soakaways which are close to drinking water extraction zones or have the potential to directly pollute aquifers including;

- Soakaways in Source Protection Zone 1 (SPZ1)
- Borehole soakaways

Then outfalls or soakaways within or hydraulically connected to sites which have national water-related designations, for example;

- Sites of Special Scientific Interest (SSSI) within 1km and hydraulically connected downstream of the asset

Finally, sites which are not designated but the impact of pollutants in highway runoff is recognised to be potentially affecting the water quality in these locations, for example;

- Direct outfalls to chalk streams
- Direct outfalls to a site where the issues preventing the receiving watercourse from reaching a good status under the Water Framework Directive (WFD) are attributed to highways/transportation.

Where identified schemes possess all, or some, of the above environmental drivers, they will be advanced for accelerated design within this commission due to the significance and/or vulnerability of the receiving watercourses.

Where schemes do not fall within the categories above, they are classified as “high-priority assets with low-priority environmental drivers.” This classification signifies that while these schemes may not have the same environmental drivers, they are still recognised as important. These schemes may be brought into design within the current TP commission if possible or alternatively will remain in the plan to be included in future design programmes.

This prioritisation aims to enable maximum environmental benefits to be realised within the bounds of funding limitations, allowing for investment in locations where the highest value can be achieved.

3.4. FUTURE ASSET PRIORITISATION

The TP is developing a Rapid Prioritisation Tool which is a GIS based analysis tool to assess and prioritise all NH outfalls, building on the concepts previously developed to complete the baseline risk assessment for outfalls and soakaways. An Implementation Plan is being produced by the TP to include a broader long-term strategy for water quality to improve the current NH approach to water quality management by March 2030 and onwards to 2050.

4

DESIGN PROCESS



4. DESIGN PROCESS

4.1. OVERVIEW

The next sections summarise the current preliminary design process. An overview of the end-to-end process can be found in Appendix A. Refer to Figure 1-2 for an overview of the suite of documents detailed below.

DESIGN STRATEGY REPORT

A programme wide design strategy report will be prepared to establish the technical basis for the preliminary design phase. This will provide a consistent approach to design across the programme.

GEOTECHNICS

A programme wide geotechnical Statement of Intent (Sol) will be produced which will cover the approach proposed to assess the level of geotechnical assessment required for each scheme. This includes assessing:

- The level of geotechnical risk that may affect each scheme;
- The level of geotechnical reporting that is appropriate/proportionate to inform each scheme design; and,
- Whether intrusive GI is recommended to manage the anticipated geotechnical risks, inform the scheme design and support the scheme during construction.

The Sol presents a flowchart to illustrate the proposed approach.

ENVIRONMENT

A summary note describing the proposed environmental process will be produced. It is understood that biodiversity unit calculations will not be required for schemes which are contained within the NH highway boundary due to the anticipated small nature of the solutions within the existing verge.

DRAINAGE – CLIMATE CHANGE

A technical note detailing the TP approach to climate change allowances is currently in development.

DESIGN PALETTE

To aid the design teams in producing efficient and consistent designs, a design palette of standardised options has been developed. The design palette has been produced to provide designers with a concise number of options which they can utilise in the preliminary designs.

The TP created a long list of options which was compiled using NH's Design Manual for Roads and Bridges (DMRB) documents, The CIRIA SuDS Manual C753, DEFRA National standards for sustainable drainage systems (2025), manufacturer's websites, case studies, and previous project examples including international best practice.

This long list of solutions was then reviewed against a number of categories which resulted in a short list of mitigation options. Further research was conducted into the short list options and the final design palette produced.

A detailed overview of the design palette development is provided in the "Design Palette Technical Note" ref. NH619526-WQT-GEN-XX-XX-RP-CD-0002.

MITIGATION SELECTION DECISION TREE

To accompany the design palette, a mitigation selection decision tree has been designed in line with the TP design principles. The decision tree assists the designers with prioritising the preferred options from the design palette depending on the specific site requirements. The mitigation selection decision tree has been developed in line with current industry guidance including the DMRB and UK government non-statutory standards for sustainable drainage systems.

The solution types have been identified as either primary solutions or additional/alternative solutions.

- Primary solutions are standard solutions that don't require a DfS application and maximise vegetative treatment where space allows.
- Additional or alternative solutions include proprietary products.

POLLUTION RISK ASSESSMENT AND MITIGATION FOR SOAKAWAYS

A technical note, NH619526-WQT-GEN-XX-XX-TN-CD-0003, has been produced by the TP to clarify the TP's position and methodology for the pollution risk assessment and mitigation for soakaways.

The NH Priority Soakaway Worksheet does not identify which pollutants need mitigating based on individual site factors. Therefore, the TP technical note includes a high-level review of studies undertaken on behalf of NH and identifies the pollutants the TP consider to be critical for soakaways.

The technical note also covers the TP's approach to progressing the design of pollution mitigation measures for soakaways in a cumulative cluster and soakaways which drain a small catchment area, neither of which are covered in the current methodology. Optimum Risk Reduction Factors have also been advised for all the treatment systems included in the short-list of mitigation options in the TP design palette.

APPROACH TO OUTFALLS DISCHARGING TO SURFACE WATER BODIES WHERE HEWRAT IS NOT APPLICABLE

NH619526-WQT-GEN-XX-XX-TN-CD-0001 details the TP's approach and methodology for the pollution risk assessment of outfalls to surface water bodies where HEWRAT is not applicable. These waterbodies include lakes, canals and tidally influenced watercourses. This technical note also includes the proposed pollutant mitigation requirements at these outfalls and will be applied in the preliminary design of solutions for these special cases.

4.2. DESIGN PATHWAYS

All schemes will progress through Stage 0 and go through a Stage Gate 1 review. The TP will then undertake a treatment approach review, which will categorise the schemes as “contained sites” or “extended sites.” A policy note will be produced by the TP which will give further details on the development and application of the proposed treatment approach and value for money tool.

TREATMENT APPROACH

The intention of this approach is for designers to consider what are appropriate and achievable pollution mitigation solutions for each location based on a number of factors;

- the sensitivity of receiving watercourse/environment
- what can be achieved within the National Highways boundary
- what provides the highest value for money

The treatment approach review categorises schemes into two location types;

- Location Type 1
 - outfalls to a special area of conservation, a special protection area, a RAMSAR site or a site of special scientific interest
 - soakaways in source protection zone 1 and borehole soakaways
- Location Type 2
 - outfalls to a chalk stream or ordinary/main watercourse, within a nature reserve or to a community space used for recreation.
 - non-borehole soakaways outside of source protection zone 1
 - sites that have been highlighted by stakeholders as an area of interest

Location Type 1 schemes where full treatment to achieve a HEWRAT pass is possible within the NH boundary are categorised as contained sites.

Location Type 1 schemes where full treatment to achieve a HEWRAT pass is not possible within the NH boundary and all Location Type 2 schemes are categorised as extended sites.

CONTAINED SITES

Contained sites are expected to be completed with a combined Stage 1 and Stage 2. The design palette and mitigation selection decision tree provide guidance on the most suitable options for each given site and result in a single preferred solution type. The design process will then review the best way to apply to solution on a site-specific basis. The scope for contained sites in the current commission includes the preliminary design up to the end of Stage 2, culminating in a Stage Gate 3 review and handover for detailed design.

It is anticipated that required design surveys, for example, topographical surveys and CCTV surveys will be completed and incorporated into the preliminary design for contained sites.

EXTENDED SITES

The process for extended sites will include a value for money optioneering exercise. This tool has been created by the TP and aligns with other stakeholder processes to compare three options. The tool compares the options against criteria including capital cost, operational cost, carbon cost, safety and pollutant removal effectiveness. The resultant preferred option will be presented to the DDWG and agreed with the group.

If the agreed preferred mitigation solution does not require land outside of NH's boundary, the scheme will follow a contained site pathway (a combined Stage 1 and Stage 2 culminating in a Stage Gate 3 review). This option may not provide the treatment required to achieve a HEWRAT pass, however, the value for money tool has been developed to provide robust justification that the option selected is the most appropriate and is considered to address the pollutant risk within the specific site constraints. In these cases, it is understood that the DDWG will sign off the partial mitigation option as acceptable and should a departure from DMRB LA113 be required, these will be applied for during the detailed design stage. Monitoring of the outfall pollutant loads or partnering opportunities within the wider catchment may be proposed to support the design option.

If the agreed preferred mitigation solution requires land outside of the NH boundary, it is understood that consultation and discussions with landowners will be coordinated and undertaken by NH and supported by the TP. A policy note will be developed to detail NH approach to use of land outside of NH boundary which is expected to focus on land use by agreement only. Once land discussions have reached a suitable level of confidence schemes will continue to develop the design. The scope for extended sites currently includes the preliminary design up to the end of Stage 1, culminating in a Stage Gate 2 review, although stage 2 won't be formally sought into and land negotiations have been concluded. It is anticipated that required design surveys, for example, topographical surveys and CCTV surveys will be scoped during Stage 1 Options Assessment for extended sites but not undertaken within the current commission.

DETAILED DESIGN AND CONSTRUCTION

As noted above, it is expected that the preliminary designs undertaken by the TP during the current commission will be developed to the end of Stage 1 "Options Assessment" or the end of Stage 2 "Preliminary Design" depending on the type of design pathway required. It is planned that the designs will be handed over to the NH OD team and their supply chain to develop the detailed design and progress the construction of the schemes. It is also understood that following the completion of the scheme, the mitigations and revised risk status of the outfall/soakaway will be updated and recorded on NH Databases (for example, GDMS and CONFIRM) to ensure the updates are logged and included in future maintenance regimes.

5

SUMMARY

5. SUMMARY

The TP has developed the site selection and scheme prioritisation processes to provide NH with a considered method to identify and prioritise sites within the current commission. The design process and pathways allow for a consistent approach for the development of the preliminary designs by the TP, while enabling the flexibility needed to design appropriate mitigation measures for each specific scheme.

APPENDICES

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APPENDIX A. PRELIMINARY DESIGN END-TO-END PROCESS

