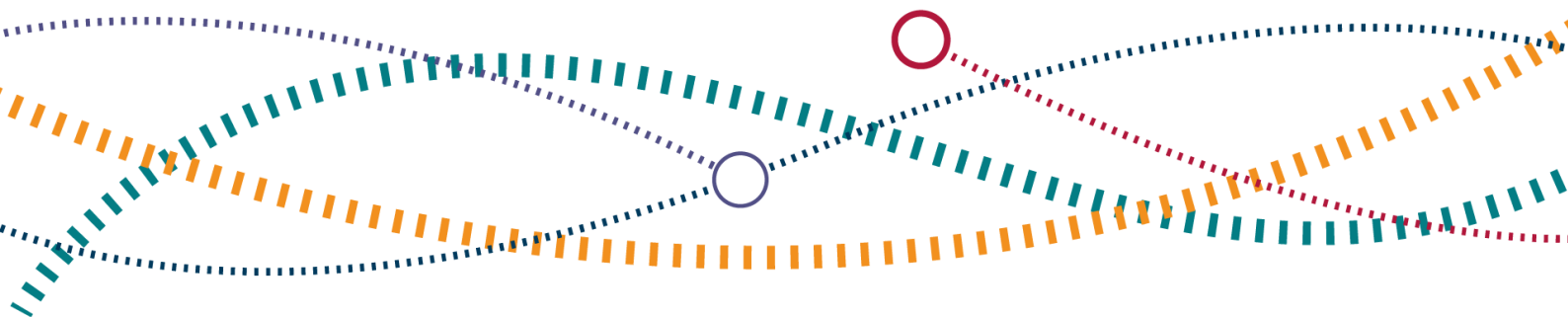




Targeted Assurance Review

Drainage Schemes Within Soil Cuttings

09 February 2026



Contents

Executive Summary	4
Key Findings.....	4
Summary of Recommendations	5
1. Introduction	7
Purpose	7
Background	7
Objectives.....	8
2. Targeted Assurance Approach	9
Scope	9
Methodology	9
3. Findings	12
Review of drainage works within soil cuttings.....	12
Slope stability and Safety.	12
Delivery of work.....	14
Compliance and Assessment	15
Key Messages	20
4. Regional review & findings	22
Overview	22
Drainage Resourcing & Organisational Structure	23
Best Practice and Innovation	26
Sustainable solutions.....	27
Key points.....	29
5. Regional on-site assurance	31
Planning and objectives.....	31
Site visits	31
Summary	34

6. Conclusions	36
7. Recommendations	38
Recommendation 1: Handback Controls	38
Recommendation 2: Drainage Organisation Models	39
Recommendation 3: MyWork Application	40
Recommendation 3a: Hardware Review	41
Recommendation 4: Access Arrangements	42
Recommendation 5: KPI framework	43
Recommendation 6: Business planning and Key Volumes	44
Abbreviations and Glossary	45
Appendices	48
A. Graphical overview of drainage interdependencies with key railway assets	49
B. Southern Region Drainage Organisation	50
C. Eastern Region Drainage Organisation	51
D. Anglia Route Eastern Region Drainage Organisation	52
E. East Midlands Route Eastern Region Drainage Organisation	53
F. North & East Route Eastern Region Drainage Organisation	54
G. Scotland Region Drainage Organisation	55
H. Wales and Western Region Drainage Organisation	56
I. Central Route Northwest & Central Region Drainage Organisation	57
J. Northwest Route NW&C Region Drainage Organisation	58

Executive Summary

Historically drainage has been a secondary or child asset, receiving lower priority than track, structures, and earthworks. This approach resulted in underinvestment, incomplete records, and a loss of specialist knowledge. Consequently, drainage has not kept pace with wider improvements, and this has contributed to issues such as track deterioration, service disruption, earthwork failures, and derailments.

To improve understanding of drainage infrastructure, Network Rail (NR) launched a mapping programme (2016–2024), which doubled the known asset inventory but also highlighted gaps in knowledge—particularly catchments, off-network systems, and asset condition. Despite progress, NR still lacks a complete and consistent picture of its water management systems.

In February 2025, the Office of Rail and Road (ORR) commissioned this Targeted Assurance Review (TAR) to seek assurance on:

- Management of health and safety files and the handback process
- Identification and oversight of drainage assets
- Integration of drainage activity into soil-cutting work programmes
- Route-level awareness of regional projects

This review was driven in part by incidents at Watford (2016), Corby Aqueduct (2019), Carmont (2020), Llandre (2024), and Goytre (2025), several of which showed similarities to the Carmont derailment. A review phase began in July 2025 to confirm findings and conduct regional site visits.

The TAR found examples of best practice that could be adopted nationally.

Key Findings

NR has structural and operational inconsistencies between regions. While progress has been made in integrated planning, innovation, and risk-based approaches, drainage is still not consistently treated as a critical asset. Accountability is unclear in some areas, and strategic frameworks—especially around Key Performance Indicators (KPI) and Key Volume Lines (KVL)—remain less mature than those for other infrastructure types.

Summary of Recommendations

1. Handback Controls

NR should consider setting up a national handback protocol for drainage works, aligned with Earthworks, Track, and S&T standards. Standardised requirements - such as verified as-built drawings, photographic records, in-process testing, and competent sign-off would improve consistency and assurance. Wales & Western provides a best practice model.

Lead: National Technical Head (Drainage)

2. Drainage Organisation Models

NR should conduct a structured review of drainage organisations across all regions. This would support a consistent operating model, informed by staffing levels, competencies, reporting lines, and escalation routes. Existing best practice in Wales & Western and Scotland could shape a framework.

Lead: Technical Authority Functional Audit Team

3. MyWork Application – Training & Access

NR should review training and access arrangements for the MyWork system to improve staff confidence, data quality, and cross-route visibility. Training should reflect operational realities and include structured feedback loops.

Lead: Head of Maintenance

3A. Hardware Review

NR should ensure frontline staff have reliable, modern devices to support effective use of MyWork. An audit of current equipment and provision of suitable hardware would improve safety, data security, and operational resilience.

Lead: Infrastructure Maintenance Delivery Managers

4. Access Arrangements

NR should review how access for drainage and off-track inspections is planned and controlled. The review should evaluate reliance on informal access points, the safety and effectiveness of night-time inspections, and opportunities to formalise access to support daytime work and improve compliance.

Lead: Regional Safety, Health and Environment Directors

5. KPI Framework

NR should develop the national KPI framework to monitor drainage condition, performance, and risk. A balanced set of indicators would enhance visibility, support assurance, and reinforce drainage as a strategic asset.

Lead: National Technical Head (Drainage)

6. Business Planning and Key Volumes

NR should review the KVL framework to ensure it reflects the full range of drainage activities, including off-network work, nature-based solutions, and safety-critical outcomes. A broader, more future-focused approach would support innovation, fair benchmarking, and long-term resilience.

Lead: National Technical Head (Drainage)

1. Introduction

Purpose

- 1.1 This TAR concerns the management of drainage schemes within soil cuttings. Broadly assessing Network Rail (NR) governance. The findings will inform future regulatory actions by the Office of Rail and Road (ORR).

Background

- 1.2 The UK rail network is organised into five regions: Scotland, Eastern, Southern, Northwest and Central (NW&C), and Wales and Western (W&W). It includes over 20,000 miles of track, 200,000 earth structures, and 32,000 bridges and tunnels. These assets traverse diverse and often challenging terrain and ground conditions.
- 1.3 As part of “holding to account” the ORR is seeking assurance that NR is managing drainage renewals schemes within soil cuttings by following best practice. This TAR stems from incidents that have highlighted potential systemic issues in the current management approach including:
- Incomplete or poor-quality CDM Health and Safety files
 - New drainage assets not in ELLIPSE.
 - Soil Cuttings schemes undertaken without drainage consideration.
 - Sub optimal scope decisions.
 - Route Engineer Drainage & Geotech (RAMs) unaware of planned or completed works.
- 1.4 The ORR concerns are evidenced by failures at recently renewed sites including:
- Watford 2016: Landslip during heavy rain caused derailment; site not flagged as high risk despite historical precedent.
 - Corby Aqueduct 2019: Train struck debris washed from cutting slope during flooding.
 - Carmont 2020: Drainage failure led to derailment and fatal collision with bridge parapet.

- Llandre 2024: Washout debris reported; earlier drainage works lacked design and were undocumented.
- Goytre 2025: Flooding from adjacent fields blocked the line; recent drainage works were undocumented and lacked design.

Objectives

1.5 This TAR seeks assurance that NR:

- Delivers compliant drainage schemes within Soil Cutting locations according to licence conditions 1.1, 2.4, 3.2 and 9.4 (best practice, efficiently, competent resources, and subject to proper governance)
- Implements suitable and sufficient assurance with governance and resources in place.
- Has awareness of recent works and is confident that they have been undertaken to the mandated standard.
- Can provide complete records that all drainage works; are in ELLIPSE, have as-built information and Maintenance Scheduled Task (MSTs).
- Can demonstrate interdisciplinary reviews with evidence of sign off.
- Can show that works have a project brief and scope, to ensure that the design is fit for purpose and has considered existing infrastructure and assets.

1.6 The above is used to assess NR's approach. There is focus on lifecycle planning and delivery readiness for future control periods as well as risks. This TAR will also be used for evaluating the effectiveness of actions taken since the Carmont derailment, in drainage installation, maintenance, and governance. The findings will guide regulatory actions.

2. Targeted Assurance Approach

Scope

- 2.1 The scope includes assessing the effectiveness of drainage schemes within soil cuttings. The focus is on works delivered between January 2022 and December 2024. The review considers schemes undertaken by Works Delivery and Capital Delivery teams. Emphasis is placed on NR's processes and systems for planning, executing, and recording drainage renewals.
- Integration of drainage with Soil Cuttings to maintain slope stability and asset integrity.
 - Compliance with relevant standards, project management protocols, and risk controls.
 - Assessment of value for money and staff competency.
 - Identification of best practices and innovations supporting lifecycle traceability and resource efficiency.
- 2.2 The first phase was a fact-finding exercise, completed by May 2025. This was followed by a region-specific request for information (RFI) in July 2025, which included:
- Deep dives into selected schemes.
 - Route-specific analysis based on earlier findings.
 - Site visits.
 - Review of TA assurance data alongside Phase 1 outcomes.

Methodology

- 2.3 This TAR is an evidence-based review, of governance, planning, delivery, and associated impacts on earthwork stability. Central and regional practices were assessed, including planning frameworks, technologies, and management systems, alongside collaboration between drainage and earthworks teams. The review was limited to “New Build” drainage key volume lines (KVL).

- 2.4 The first phase reviewed how change control is managed. The approval and oversight of workbank adjustments such as scope optimisation, cancellations, prioritisation, and deferrals was also reviewed.
- (a) Effectiveness was measured using performance tools and metrics covering cost, efficiency, safety, and train performance.
 - (b) Risk management practices were analysed. This determined how risks linked to workbank changes are identified, evaluated, and communicated. Lessons learned from past projects were reviewed.
 - (c) Staff and contractor competence was evaluated in terms of skills and qualifications. Post-installation assurance processes were checked to confirm that drainage assets meet design and compliance standards.
- 2.5 The second phase assessed works on site, by reviewing works undertaken at five locations within each of the five regions. Those were chosen based on age, delivery method, and relevance. These site visits were used to:
- (a) Validate data from systems such as ELLIPSE, MyWork, and MSTs against actual field conditions, providing evidence of asset records aligning with real-world conditions and highlighting good practice, innovation, and effective coordination models.
 - (b) Check asset records, maintenance schedules, project documentation, design verification, catchment analysis, and installation effectiveness. Regions were invited to present supporting data flexibly, reinforcing accountability and best practice as outlined in the RFI letter.
- 2.6 As part of this review a high-level graphical analysis (Appendix A) has been produced detailing the interdependencies between drainage and other railway asset types.
- Central Element: Drainage (blue circle) is at the core, indicating it is a critical factor influencing multiple aspects of railway infrastructure and operations.
 - Asset Types (Green boxes): Track, Structures, Earthworks, Buildings, Mining, and Signalling & Telecoms. These are physical components of the railway system that drainage directly or indirectly affects.
 - Impacts (Yellow boxes): Flooding, Landslides, Washouts Accidents, Delays, Pollution, Ride Quality. These are consequences that arise when drainage is inadequate or fails.

- Outputs (Red boxes): Safety and Reputation. These represent high-level outcomes that are impacted by drainage performance.

2.7 Appendix A illustrates that drainage is a foundational element in railway infrastructure. Its condition affects all asset integrity, operational reliability, and safety. Poor drainage leads to cascading impacts such as flooding, washouts, landslides, and delays.

3. Findings

Review of drainage works within soil cuttings.

3.1 The following evidence was requested and reviewed:

- An internal review of all drainage works undertaken in Soil cuttings between: Jan 2022 – Dec 2024.
- A high-level list from Oracle of Key Cost Lines (KCL) of earthwork soil cutting data: Jan 2022 – Dec 2024.
- A narrative from the region on works pre and post Carmont (Pre: Jan 2022) within the response's regions were asked to consider Watford, Salsbury, and Carmont incidents and what has changed.
- The identification and adoption of best practice around Drainage and Water Management

3.2 The repos provided by the NR regions are set out in this section.

Slope stability and Safety.

3.3 Drainage is fundamental to maintaining the stability of soil cuttings. When excess water builds up in the ground it increases pore pressure and saturation, which can trigger slips, washouts, or shallow failures. To reduce these risks, a combination of engineered drainage systems, vegetation management, and remote monitoring is employed. Solutions include crest drains, toe drains, interceptor ditches, and geo-composite drains designed to control water ingress and runoff. Vegetation is also managed to limit infiltration and preserve slope integrity. Monitoring tools such as piezometers, inclinometers, and rainfall gauges provide real-time data on water levels and slope movement.

3.4 NR In accordance with Eurocode 7 (EC7) and NR/L3/CIV/071 Geotechnical Design, assesses slope stability using three main indicators. The Factor of Safety (FoS) is determined through limit equilibrium methods. Acceptable values are supported by monitoring, staged construction, and adaptive management. The FoS varies according to criticality, potential consequences of failure, design codes referenced, and the level of monitoring and control. Through the observational approach, adaptive management is enabled, uncertainties are managed via

staged construction, instrumentation, and ongoing assessment, rather than relying solely on conservative initial design margins.

- 3.5 The Probability of Failure (PoF) incorporates uncertainty in soil properties, loading, and environmental conditions, and is combined with consequence ratings to form the Geotechnical Asset Risk Rating (GARR). PoF values are updated using inspection data, remote sensing technologies such as LiDAR and satellite InSAR, and climate information including rainfall thresholds and antecedent moisture levels. Alongside these measures, ground movement trends are tracked across cuttings, embankments, and adjacent earthworks as part of NR's geotechnical strategy. This strategy emphasises whole-life asset management, data-driven prioritisation, and climate adaptation, particularly in response to extreme rainfall.
- 3.6 Despite increased monitoring and intervention, slope failures have continued across the network in recent years (Table 3.1). Many earthworks were constructed without drainage, leaving them vulnerable to instability, especially under the pressures of intense rainfall and prolonged wet periods. To address this, NR has expanded its use of geotechnical modelling and ground investigation.

Table 3.1 Major UK Rail Slope Stability Failures (2020–2025)

Date	Location	Incident	Cause	Impact
Aug 2020	Carmont, Stonehaven	Train derailment due to landslip	Intense rainfall triggered washout	Three fatalities, national review of earthworks
Jan 2021	Edenbridge, Kent	Landslip on embankment	Saturated clay and poor drainage	Line closure, emergency repairs
Feb 2022	Hook, Hampshire	Slope failure near track	Shrink-swell clay and prolonged wetting	Speed restrictions, slope regrading

Nov 2023	South Wales Valleys	Multiple shallow slips on legacy cuttings	Steep Victorian slopes, heavy rainfall	Disruption to services, vegetation clearance
May 2024	Hastings Line, Sussex	Earthwork movement detected via remote monitoring	Antecedent moisture and poor drainage	Preventative works initiated
Jul 2025	Calder Valley Line	Washout and slope instability after flash flooding	Extreme weather and blocked drainage	Line closure, slope reinforcement

Delivery of work

- 3.7 This review involved understanding how drainage schemes within soil cuttings are delivered. Works are undertaken by Works Delivery or Capital Delivery. NR owns both Works Delivery and Capital Delivery programs. Works Delivery is fully in-house and Capital Delivery is owned strategically by NR, but the work is delivered through external contractors under framework agreements.
- 3.8 Capital Delivery is an approach to project delivery, using region-specific framework contracts. Delivering major enhancements and infrastructure projects. Projects are categorised by value and complexity and can include multidisciplinary engineering works such as bridges, earthworks, and retaining walls.
- 3.9 Works Delivery focuses on pre-planned minor to large scale projects. These are internal renewals rather than routine maintenance.
- 3.10 There is variation in delivery models across the regions (Figure 3.1). Eastern demonstrates the strongest emphasis on Works Delivery, with activity levels significantly exceeding Capital Delivery. In contrast, NW&C exhibits a near-even split between the two delivery types, while W&W and Southern lean slightly toward Capital Delivery. Scotland stands apart, with minimal Works Delivery and a clearer focus on Capital Delivery.

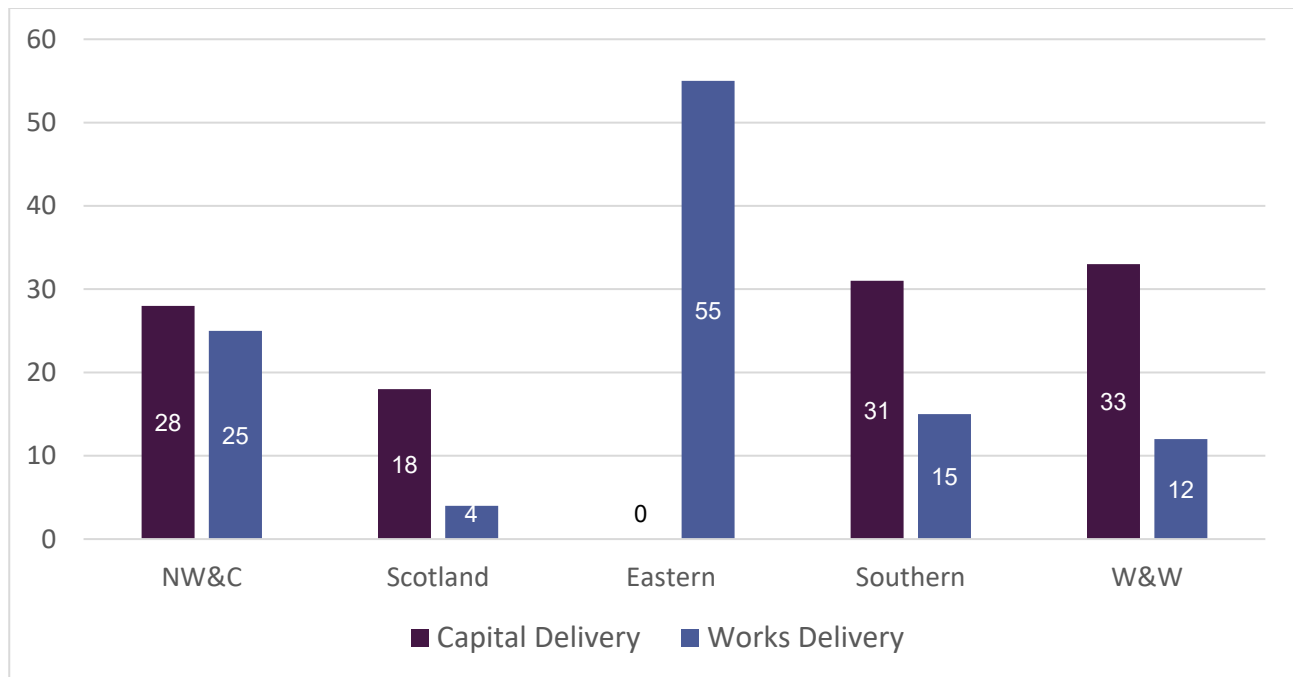


Figure 3.1 Regional Split of Projects by Delivery Type

- 3.11 This distribution reflects strategic differences across regions. In Scotland, most of the development activity is delivered through Capital Delivery. For drainage-specific projects there is a shift towards internal development led by Engineering Services Design Delivery (ESDD), enabling early risk identification and preliminary design.
- 3.12 Where drainage is incorporated within wider earthworks schemes, delivery is achieved through a combination of supply chain design consultants and in-house capability.
- 3.13 Eastern prioritises operational works, while NW&C, W&W, and Southern maintain a more balanced mix. These variations highlight how regional delivery approaches are shaped by local priorities, available capabilities.

Compliance and Assessment

- 3.14 Each region was asked to assess its compliance with its governance and standards for drainage assets installed. Specifically, regions were asked four key questions:

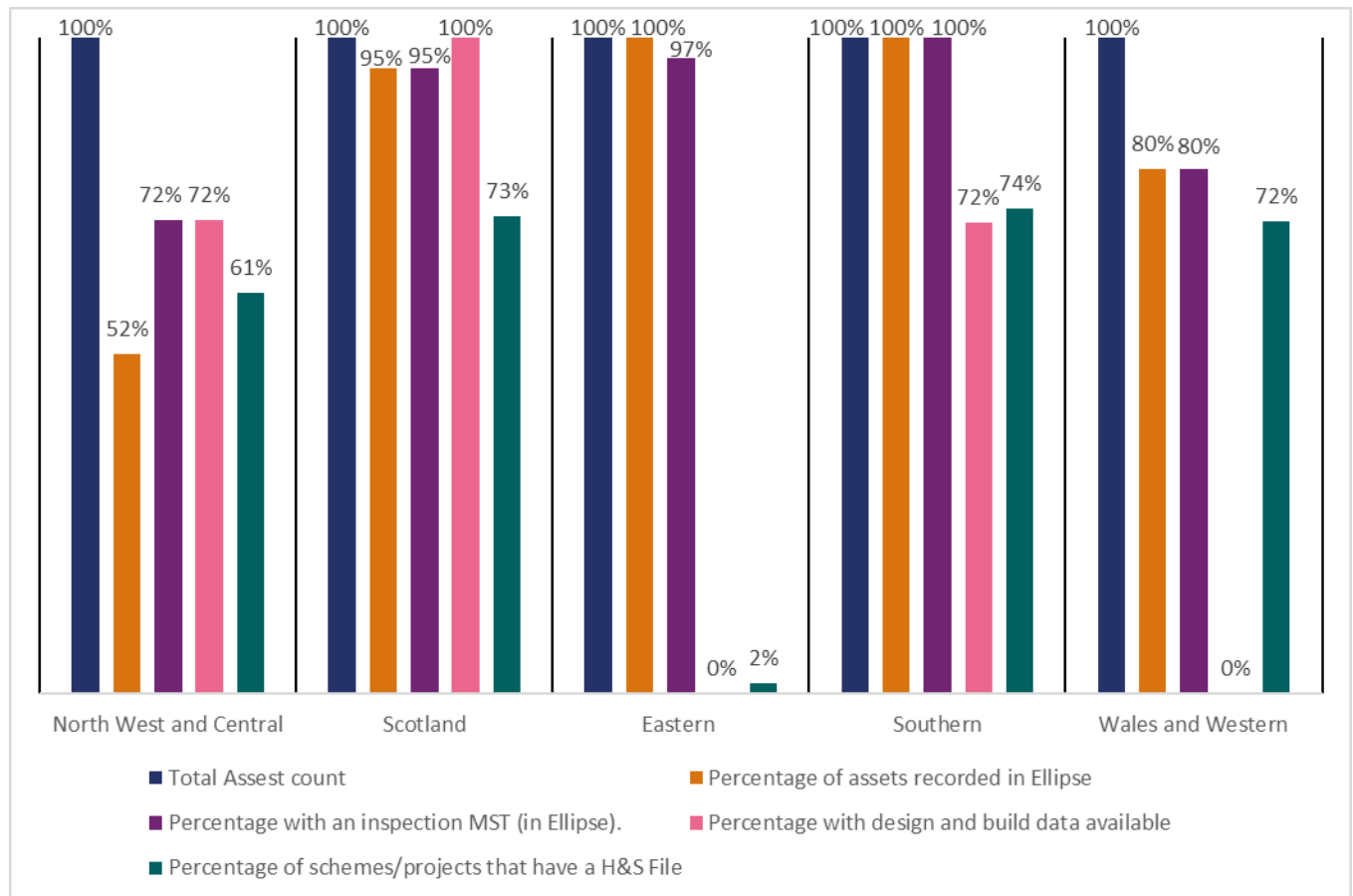
- Are new assets recorded in Ellipse?
- Are MSTs assigned for inspection?
- Is design and build data available?
- Does the scheme/project have a Health & Safety (H&S) file?

3.15 The responses are shown in figure 3.2.

3.16 The Common Safety Method on Risk Evaluation and Assessment (CSM-RA) is a risk management framework applied to significant changes within the railway system, as defined under the Railways and Other Guided Transport Systems (Safety) Regulations 2006.

3.17 Where construction takes place on the railway, both CSM-RA and the Construction, Design and Management (CDM) Regulations 2015 may apply. In such cases, the CSM-RA process informs the CDM hazard log and associated documentation. CSM-RA ensures the completed asset is safe to operate, while CDM focuses on the safety of the construction project itself. Not all schemes require a H&S file under CSM-RA, and its absence does not necessarily indicate non-compliance.

Figure 3.2 Regional RFI Question Responses with Declared Relevant Asset Counts



3.18 The responses revealed several areas of concern:

- Design Quality:** Where design and build data is lacking, there is a risk that generic solutions are being deployed without site-specific planning, potentially compromising water management and increasing vulnerability to flooding.
- Climate Resilience:** Inadequate documentation of historic design and asset installation, coupled with limited readiness for risk-based inspection, may hinder the ability to adapt drainage systems to future climate challenges.
- Health and Safety files:** The variable availability of H&S files and design data in several regions reflect concern that safety and design standards have not been fully embedded into project delivery.

3.19 The regional insights from this data evidence included:

- Scotland demonstrates strong compliance and governance across all criteria. Despite having a smaller total asset count compared to other regions, its performance reflects a clear emphasis on quality. This focus on governance and assurance illustrates Scotland's commitment to maintaining compliance standards.
- Eastern has the highest number of schemes completed and shows reasonable compliance in asset recording and MST readiness. There is a reduction in the availability of design/build data availability, and H&S documentation. This suggests a need for an improvement in data management and documentation control around project handback and governance.
- W&W, with a smaller asset base, demonstrates moderate compliance levels. While asset recording and inspection readiness are reasonable, there is scope to strengthen design data availability and improve H&S file completion to align with best practice.
- NW&C and Southern regions show moderate asset volumes with balanced compliance across most criteria, though none are exceptionally high. This indicates a steady but less mature governance approach compared to Scotland.

- 3.20 In response to Carmont RAIB Recommendation 1, NR introduced a strategy in January 2024 to ensure the timely preparation and handover of 'as-built' drawings and H&S files. There has been effort since to close gaps and strengthen the identification of drainage assets.
- 3.21 The findings from this review show that this strategy has not been consistently embedded across all regions. The continued absence of H&S files undermines asset mapping work and compromises the effective maintenance of newly installed drainage assets. The review highlighted variable availability of H&S files and design data across regions, raising concern that safety and design standards have not yet been fully integrated into project delivery.
- 3.22 This was shared with NR in November 2025, and they were asked to confirm the existence of H&S files for drainage works within soil cuttings. Where responses indicated that no file was available, regions were required to confirm whether a file was necessary under CSM, particularly for significant works. The responses highlighted notable variation in compliance. Scotland demonstrated a best-in-class

handback process, with only two locations identified where H&S files were absent despite being required (see Table 3.2).

Table 3.2 Overview of H&S File Availability by Region (Nov 2025)

	Drainage projects	Yes	No – with Justification	No – With no Justification	N/A
National	230	104	65	12	49
NW&C	54	33	7	0	14
Scotland	22	16	2	2	2
W&W	45	26	0	2	17
Eastern	63	3	56	4	0
Southern	46	26	0	4	16

- 3.23 Across other regions, several failed to demonstrate possession of required H&S files for drainage schemes installed within Earthworks sites. In some cases, regions were unable to justify the absence of files or provide assurance of remedial actions.
- 3.24 Subsequently, NR has taken steps to close the gap and provide narrative evidence to address the issues identified. By December 2025, ORR has received an updated pack outlining how outstanding gaps will be resolved. The review concluded with NR confirming the existence of H&S files where required and offering commentary to justify cases where a file was not deemed necessary under CSM. Throughout this process, NR has engaged closely with ORR, demonstrating a clear commitment to compliance and delivering a positive outcome.

Table 3.3 Updated Health & Safety File Availability by Region (Dec 2025)

	Drainage projects	Yes	No – with Justification	No – With no Justification	N/A
National	230	108	66	0	56
NW&C	54	33	7	0	14
Scotland	22	18	3	0	1
W&W	45	28	0	0	17
Eastern	63	3	56	0	4
Southern	46	26	0	0	20

Key Messages

- 3.25 The assurance review highlighted areas requiring improvement to strengthen compliance, delivery effectiveness, and consistency.
- 3.26 Delivery volumes vary significantly, Eastern and NW&C delivered the highest number of drainage schemes within soil cuttings, while Scotland recorded the lowest. Despite managing a smaller asset base, Scotland demonstrated strong governance and consistently high performance in asset recording, inspection readiness, and design data availability. In contrast, Eastern region, despite its high delivery volumes, showed weaknesses in design/build data and health and safety documentation. NW&C, Southern, and W&W displayed moderate compliance and has scope to improve design data and H&S file completion.
- 3.27 At a national level, concerns were raised about reliance on generic drainage design solutions and their adequacy in addressing water and climate risks. In response, the Technical Authority updated and expanded the suite of drainage standard detail drawings (SDDs), requiring project-specific designs tailored to site conditions. This aligns with NR standard NR/L3/CIV/151, which governs

engineering assurance of standard designs and details, ensuring that drawings are not used “off the shelf” without proper engineering assurance.

- 3.28 NR has committed £2.8 billion during CP7 to activities delivering primary resilience benefits across the UK rail network. Of this investment, £570 million is allocated to drainage and £1.26 billion to earthworks, with the remainder directed towards other resilience-related assets such as track, structures, and vegetation. This funding forms a cornerstone of the climate resilience strategy, embedding lessons learned from past incidents and aiming to establish best practice consistently across the network.
- 3.29 Failures in cuttings and earthworks continue to occur, driven by uneven adoption of best practices and inconsistent integration of drainage within wider programmes. While some regions demonstrate positive examples of integrated approaches, broader and more consistent implementation is required to strengthen resilience and improve safety outcomes.
- 3.30 The governance framework underpins these priorities. CIV/151 ensures that standard drawings undergo rigorous engineering assurance, while alignment with CDM 2015 and CSM-RA processes safeguards both construction and operational safety. By requiring project-specific designs where appropriate, the framework reduces reliance on generic solutions that may not reflect local conditions, thereby embedding best practice and reinforcing compliance across the network.

4. Regional review & findings

Overview

- 4.1 NR's drainage technology strategy focuses on enhancing infrastructure resilience through smart monitoring, integrated data, and sustainable asset management. NR has invested in technologies that combine digital asset management, remote monitoring, and data-driven decision support.
- 4.2 The foundation of this strategy lies in the digitisation of drainage asset management. StrEAMS, a GIS-enabled platform, integrates with systems such as Ellipse, and supports mobile data capture for field inspections. StrEAMS improves visibility, traceability, and decision-making. It aligns with recommendations to treat drainage as critical infrastructure, supporting whole-life asset planning, climate resilience, and cross-asset integration.
- 4.3 Following the Watford Cutting RAIB recommendations, all regions completed drainage asset inventories, which are now embedded in StrEAMS to strengthen inspection and maintenance planning.
- 4.4 The Asset Risk Evaluation Tool (ARET) provides a central platform for asset risk assessment and regional performance monitoring. Linked to StrEAMS and feeding directly into Ellipse, ARET enables desktop reviews, mapping, and filtering, KPI dashboards, and integration with Work Arising Identification Forms (WAIFs). Together, these systems underpin assurance processes by linking asset condition, inspection schedules, and risk factors. However, challenges remain, including limited KPI standardisation across regions and funding, which restricts development.
- 4.5 Remote monitoring technologies have been deployed to strengthen oversight and enable early risk detection. Wireless tilt meters, solar cameras, silt detection, and geotechnical monitoring systems provide real-time alerts on ground movement. However, adoption is limited across the network. Helicopter inspections extend coverage to inaccessible areas.
- 4.6 In Scotland there are rainfall-triggered speed restrictions and Weather Operations Delivery Managers (WODMs) equipped with forecasting tools. Drainage Remote Condition Monitoring (RCM) such as TrackWater have also been introduced at selected sites to detect rising water in catchpits, with the technology commercially available.

- 4.7 RCM systems and dashboards enhance performance tracking by identifying early signs of blockage or failure. Consolidated dashboards allow detailed analysis of inspection compliance, training progress, and asset condition, with the ability to drill down to individual assets or staff for targeted performance management.
- 4.8 The Earthworks Review by Lord Robert Mair recommended the establishment of Slope Safety Review Groups (SSRG) to oversee high-risk assets and ensure stability assessments that account for drainage and hydrological risk. These multidisciplinary groups integrate geotechnical, drainage, asset management, and climate resilience expertise, promoting a whole-system approach.
- 4.9 NR has launched the Weather Risk Taskforce (WRTF) and Drainage and Lineside Advancement Programme, which has improved inspection protocols to enhance drainage performance, reducing probability of failure, and maintain factor of safety under volatile weather.
- 4.10 The strategy continues to evolve with focus on data assurance and intelligent asset management. Regions are validating information within Ellipse to support long-term decision-making, while geospatial cleansing is enhancing the accuracy and reliability of asset records. Risk-based modelling is applied to drainage areas, assigning scores from high to low and linking them to tailored inspection regimes.
- 4.11 Inefficiencies have emerged with the transition to the MyWork app and MyWork Manager, particularly in the integration between Ellipse, StrEAMS, and MyWork. Misalignment and replication of master data have created duplication of effort and weakened the connection between on-site risk observations and business-level reporting.
- 4.12 Regions have implemented drainage management programmes, with including engagement with the WRTF. These efforts support continuous improvement and ensure that drainage resilience remains a core component of earthworks and track safety across the network.

Drainage Resourcing & Organisational Structure

- 4.13 Drainage historically was not a standalone asset class. It was included under categories such as off-track, earthworks, or track, which led to fragmented ownership, inconsistent inspection regimes, and reactive maintenance practices. Technical competency was limited, with no formal training pathways and minimal understanding of hydraulic performance, deterioration mechanisms, or asset criticality. Dedicated full-time employees were not the norm, and interventions

were undertaken by generalist teams lacking specialist knowledge. This contributed to performance issues including track geometry degradation, earthwork instability, and service delays caused by flooding.

- 4.14 Since 2017, NR has strengthened its approach to drainage by recognising it as a distinct asset category. Dedicated training covers hydraulic modelling, condition grading, and intervention planning. Formal inspection protocols and standards have been introduced to ensure a consistent, risk-informed approach across regions. These developments are supported by the Drainage Technical Strategy and Drainage Asset Policy.
- 4.15 This review identified further areas for improvement including clearer role definitions, increased specialist capacity, and stronger integration of drainage condition data into asset risk models. It was identified that updating the Drainage Risk Model to incorporate catchment data would provide an improved basis for managing risk.
- 4.16 NR does not maintain a nationally consistent full-time employee (FTE) count for drainage-specific personnel. Responsibilities are embedded within broader roles across Maintenance Delivery Units (MDUs), Asset Management, and Engineering teams.
- 4.17 This approach has led to significant regional variations in how drainage is managed, resourced, and prioritised. The ORR's 2021 TAR on Drainage Maintenance highlighted these. Scotland and Western & Wales regions demonstrated clearer ownership and structured delivery models, supported by Off-Track Maintenance Engineers who were accountable for drainage maintenance and inspection at DU level. This dedicated accountability proved to be key in improving planning, reporting in Ellipse, and prioritisation of resources. By contrast, other regions relied heavily on general maintenance staff with limited drainage expertise.
- 4.18 Although national technical leadership is provided by the Drainage Technical Head, delivery at region, route and DU level remains inconsistent and, in cases, under-resourced. Organisational structures differ across the regions and routes. This disparity is significant and extends beyond regional boundaries, with multiple route-level configurations often varying within the same region (Appendices B to J). In most areas, drainage responsibilities sit within the off-track discipline under the MDU hierarchy. However, some regions have adopted more integrated models, embedding drainage alongside other asset disciplines. These organisational arrangements continue to evolve.

- 4.19 A key finding from this review is the absence of drainage within the RACI (Responsible, Accountable, Consulted, Informed) framework to define job roles and responsibilities. This has contributed to the multiple team structures and management approaches.
- 4.20 In most cases, regional drainage teams report to Earthwork Asset Managers, but in the NW&C region drainage sits under permanent way, creating a distinctly different funding and operational dynamic.
- 4.21 Reporting structures have become more clearly defined in regions that have adopted the Off-track Maintenance Engineer (OTME) and Assistant Off-track Maintenance Engineer (A-OTME) model for drainage and lineside responsibilities, which has improved accountability and performance. However, anomalies remain, with some drainage departments lacking discipline leads or dedicated planning support.
- 4.22 Staffing remains below projected requirements. Initial plans anticipated the recruitment of 429 additional resources across vegetation and drainage; however, current figures reflect an increase of only around 202 personnel nationally. Each FTE is assumed to deliver seven hundred productive hours annually, forming the basis for crew sizing and workload distribution analysis. Staffing levels have risen from 116 FTEs in 2019/20 to around 143 FTEs in 2024/25. However, the volume of completed work units has increased at a significantly higher rate than recorded hours, suggesting that external delivery mechanisms or operational efficiencies are contributing to output. Based on an average of 1,000 hours per person, the current workload equates to approximately five hundred personnel nationally substantially exceeding the actual headcount. Regional data reveals considerable variation in drainage resource requirement. (See Table 4.1)

Table 4.1 Regional Average FTE head count

Region	Committed Drainage FTE Headcount average
NW&C	113
Scotland	53
Eastern	103
Southern	79

W&W	89
Total	437

- 4.23 The available figures provide an indicative benchmark, as the data does not clearly separate vegetation from drainage activities. This lack of distinction limits the ability to assess resource allocation accurately and to identify specific gaps in drainage capability. Although modelling has been undertaken using drainage standard jobs to estimate inspection and maintenance work times, the absence of a clear demarcation between vegetation and drainage obscures understanding of how resources are deployed.
- 4.24 It is unclear how regions account for staffing and delivery, including whether works are undertaken by internal teams or external contractors. The current model suggests that increasing work volumes are being absorbed without a proportional rise in drainage staff. This raises concerns about the sustainability of the approach and the ability to maintain effective drainage capability over the longer term.

Best Practice and Innovation

- 4.25 In Scotland, a catchment to outfall design philosophy underpins water management, encouraging solutions that address the whole system rather than focusing narrowly on slope strengthening or immediate railway performance. This philosophy reflects the growing understanding that drainage is fundamental to slope stability and geotechnical risk modelling, not just a supporting function.
- 4.26 NR's management of drainage is guided by technical standards and strategic frameworks that set out requirements for design, inspection, maintenance, and renewal. These standards cover open channels, piped systems, culverts, and soakaways, and they clarify responsibilities across asset boundaries, such as between RAM Drainage and RAM Structures.
- 4.27 The Drainage Asset Policy and Technical Strategy promote lifecycle planning, climate adaptation, and integration with adjacent systems, reinforcing drainage's role in resilience and safety. Much of the infrastructure is legacy not designed for current rainfall intensities, and data gaps combined with inconsistent resourcing limit effective decision making and intervention planning.
- 4.28 To address these challenges, NR launched the Drainage and Lineside Resilience Programme, led by the national Technical Head of Drainage. The programme has

advanced asset management maturity by improving data capture, enabling risk-based prioritisation of renewals, and developing decision support tools for whole life costing and climate resilience modelling. Inspection and renewal planning are now being aligned with CP7 funding and assurance processes. At the regional level, risk-based inspection and maintenance regimes have been adopted, assigning scores from Highest to Lowest to drainage assets and tailoring interventions accordingly. Dynamic risk management is reinforced through adverse weather assessment processes, particularly in Scotland, Eastern, and NW&C regions.

- 4.29 Innovation is promoted, with safety improvements including reductions in high potential incidents and near misses. However, evidence of direct impact on delay minutes or broader operational performance remains limited. This highlights the need for KPIs that link innovation and sustainability initiatives to measurable outcomes, ensuring long-term value creation and performance improvement rather than short term fixes.
- 4.30 Inspection teams face practical challenges in accessing crest areas safely. Measures include rope protection systems to manage risks when working near barbed wire, and access dispensation arrangements via fencing systems where formal entry points are unavailable. These are documented in packs and supported by location pins such as What3Words, with long-term plans to add permanent access facilities at frequently inspected sites. Quick and safe access is critical, particularly where the only access is via track and therefore time limited. Risk mitigation measures have also been introduced, such as clearing crest drains, installing sluice gates at runoff outlets to control silt, deploying monitoring cameras, and constructing bio-built silt savers from geotextile mats, hessian lining, and willow fencing. These function as filters, preventing slurry and mud from reaching the crest and causing washouts, while allowing water flow to continue through cascades and track drains.
- 4.31 Third-party land ownership, neighbouring developments, and highways remain constraints, with land acquisition often hampered by competing development opportunities that increase risk to railway assets. NR is working to strengthen relationships with landowners and local authorities. These external pressures underline the importance of integrated planning, innovation, and collaboration to ensure drainage assets deliver resilience and safety across the network.

Sustainable solutions

- 4.32 NR is advancing its sustainable drainage strategy to strengthen infrastructure resilience, reduce flood risk, and support climate adaptation. Under CP7, £570

million has been allocated to improve earthworks and drainage assets, with priority given to areas most susceptible to failure.

- 4.33 New proposals must align with the drainage hierarchy, incorporate hydraulic modelling and capacity assessments, and ensure long-term access and maintainability, while avoiding adverse impacts on infrastructure and supporting wider asset management objectives.
- 4.34 Challenges in drainage management have been highlighted by the ORR's 2021 TAR, which identified an East–West divide in maintenance practices and the need for stronger coordination between MDU and regional teams. Internal assurance reviews have echoed these concerns, pointing to inconsistencies in regional oversight and reinforcing the importance of governance, clearer accountability, and collaborative planning. Although SuDS and Natural Flood Management (NFM) approaches are being trialled across regions, most notably in Scotland and NW&C, widespread implementation is constrained by high capital costs, limited volumetric data, and land availability.
- 4.35 NW&C has developed creative communication tools, such as a “Top Trumps” style game, to engage route teams with SuDS concepts in an accessible format. More broadly, the adoption of SuDS and NFM supports integrated asset lifecycle management, enabling better insight into deterioration trends and facilitating targeted interventions in high-risk areas. The StrEAMS platform has been instrumental in consolidating drainage and lineside data, breaking down silos through improved catchment mapping, failure tracking, and weather-linked forecasting. Larger enhancement programmes are informed by these insights, yet financial controls, commercial support and volume-based reporting often override engineering judgement, limiting uptake of technically viable solutions. To achieve progress, investment decisions should be guided by technical requirements rather than cost or reporting constraints.
- 4.36 Since 2020, NR has advanced the integration of geotechnical and drainage asset management, supported by climate resilience expertise and national initiatives such as SSRGs, remote monitoring, and adverse weather reporting. Drainage inventories are in Ellipse and visible through the Geo-RINM Viewer (GRV) and StrEAMs. GRV provides mapped drainage assets, while StrEAMs enables access to complete and planned works, photographs, and risk evaluations. Functionality between StrEAMs and MyWork remains limited. Integration was not in the original MyWork project scope, but review findings highlighted that closer alignment between these exceptional tools would strengthen asset management.

- 4.37 Emerging strategies and standards are promoting a shift toward long-term, risk-based investment planning. Priorities include the adoption of low maintenance materials, nature-based solutions, and climate resilient designs. Developing an engineering led drainage performance metric that incorporates technical, social, environmental, and reputational factors would represent a significant evolution from traditional maintenance models to a digitally enabled, intelligence led approach. Innovation is promoted, with safety metrics showing improvement, but operational impacts remain unclear due to limited KPIs. Aligning regional practices and developing performance linked measures will be critical to embedding innovation and achieving strategic outcomes. As PR28 approaches, NR should transition from volume centric metrics to outcome-based reporting, linking drainage performance to train reliability and environmental compliance.
- 4.38 Expanding volume categories to include modern interventions, such as attenuation ponds, filter drains, geo-cellular tanks, and permanent pumps would support sustainability and accurate cost tracking. At present, these items exist within the drainage hierarchy but are not consistently populated or well understood. A systemwide approach is needed to ensure all assets, including those outside NR boundaries that are maintained, are incorporated. For example, ponds and tanks currently fall under the Chamber Key Volume Line (KVL), but a more comprehensive metric is required to avoid confusion between unit rates for catchpits and ponds.

Key points

- 4.39 Since 2020, NR has strengthened geotechnical and drainage asset management, supported by climate resilience expertise and national initiatives such as SSRGs, remote monitoring, and adverse weather reporting. Drainage inventories are held in Ellipse and accessible in StrEAMS, improving visibility and planning.
- 4.40 The transition to MyWork has created workflow inefficiencies. To address this, the Drainage and Lineside Resilience Programme was launched, prioritising data quality, risk-based renewals, and climate adaptation, with inspection models increasingly benefiting from cross-disciplinary collaboration. However, the splitting of this function into two separate systems MYWork and STrEAMs has created workflow inefficiencies and onsite challenges persist.
- 4.41 Drainage staffing remains inconsistently defined, with responsibilities absorbed into broader roles, creating regional variation in accountability. The absence of discipline leads or the OTME/A-OTME model in some regions has fragmented planning. ORR's 2021 TAR highlighted these disparities, noting stronger ownership in the Eastern region compared with others. Their inventory is the lowest quality in Ellipse.

As a result, the region is now transitioning to Maintenance DUs reliant on general maintenance staff.

- 4.42 Performance management is constrained by the lack of volumetric reporting. While catchment mapping, digital integration, and clearer asset ownership have laid foundations, a formalised framework is needed to support investment and condition tracking. Unit rate improvements have increased visibility but exposed persistent issues in scoping, costing, and shared funding, particularly where drainage overlaps with earthworks and track renewals. Some regions are piloting 'virtual' earthwork volumes to better reflect drainage activity. Innovation are being promoted, with safety metrics improving, but operational impacts remain unclear due to limited KPIs. Aligning regional practices and developing performance-linked measures will be critical to embedding innovation and achieving strategic outcomes.
- 4.43 NR could benefit by moving from volume-centric metrics to outcome-based reporting, linking drainage performance to train reliability and environmental compliance. Region's advocate expanding volume categories to include modern interventions such as attenuation ponds, filter drains, geocellular tanks, and permanent pumps, supporting sustainability and accurate cost tracking.

5. Regional on-site assurance

Planning and objectives

- 5.1 As part of the final phase of the RFI, each region was asked to host ORR for up to five site visits between September and December 2025. These visits were intended to verify the accuracy of data held in systems such as StrEAMS, ARET, and GRV against actual site conditions. This section summarises observations and discussions from the visits, focusing on the extent of works completed, the rationale for interventions, and plans. The visits provided valuable insight into drainage renewal strategies, asset management processes, and operational challenges across the regions.
- 5.2 Locations were selected based on factors including the age of the works, delivery method, and whether the site presented a particular area of interest. Before the shift began, an introductory session was held to explain the purpose of ORR's attendance and to walk teams through the question sets. Representatives from RAM, regional, and DU teams were present, and every effort was made to keep the sessions unobtrusive and to put site teams at ease with ORR's presence.
- 5.3 All sites provided a full Controller of Site Safety (COSS) briefing, ensured staff were scanned in and confirmed fit for work, and arranged Track Visitor Permits (TVPs) where required for non-PTS holders. ORR extends thanks to the professionalism of all teams encountered during this phase of work; their conduct and commitment are a credit to the regions in which they operate.

Site visits

- 5.4 Site visits provided evidence of progress across drainage programmes, highlighting achievements and ongoing challenges. Completed works demonstrated clear rationale for interventions and forward planning, supported by data packs and visual reviews. Several sites had advanced through successive phases of renewal, illustrating the evolution of drainage planning.
- 5.5 More recent projects, particularly those initiated after 2023, showed a transition towards data informed methodologies that integrated site knowledge, flow monitoring, and targeted strategies to increase capacity in critical areas. At legacy installations, gaps were evident where fluvial and pluvial system designs had not been incorporated, leaving "missing link" sections now being revisited to ensure

future interventions fully account for wider catchment dynamics, including the influence of adjacent highway systems on localised flooding.

- 5.6 Access constraints are an operational challenge. Formal, safe access points for drainage and off-track teams are limited across much of the network, meaning many sites cannot be reached without stepping onto the track. In several regions this has forced inspections to take place outside daylight hours, or required route teams to identify informal alternatives, such as climbing fences or via steep embankments and cuttings.
- 5.7 Some inspections are now restricted entirely to short night-time windows, reducing visibility and increasing concerns around crest asset maintenance. In many regions the programmes were designed around daylight working and full track access. That no longer holds. To manage this gap, teams have begun using What3Words to precisely identify, record, and communicate safe access locations, via off-network locations.
- 5.8 CCTV and dye-testing kits are already in use, with national rollout expected in the coming months. Trials of backpack-mounted CCTV units are underway to improve safety and reduce manual-handling risks. Regions have also invested in alternative equipment, such as jetting attachments for RRV vehicles, to clear blockages more efficiently and avoid reliance on larger drainage trains.
- 5.9 The review highlighted both the potential and the ongoing challenges associated with the MyWork application. Staff acknowledged its capability to modernise inspection processes, noting the benefits of removing paper records, improving the accuracy of inspection questions, and enabling asset visualisation through GRV maps. Adjustments made by the TA to inspection forms were viewed positively, as they improved relevance and clarity. When operating effectively, MyWork demonstrates clear potential to enhance data quality and streamline asset management activities.
- 5.10 These strengths were frequently overshadowed by usability concerns. On-site data entry was consistently described as slow and cumbersome, particularly in adverse weather conditions. Many staff expressed a preference for reinstating desktop input options to reduce reliance on mobile devices, although this raised questions about expectations for completing inspections in the field. RAM teams also reported that the current work-group structure is restrictive, with cross-boundary works and host teams unable to access other DU data. This resulted in Route RAM teams having to join multiple groups to complete routine tasks. Integration with STRAM was

identified as a potential means of improving drainage asset condition tracking and performance management.

- 5.11 Device limitations compound these issues. Cold and wet conditions accelerated battery failures, and inspections involving more than one hundred assets frequently exceeded device capacity. Compatibility issues added additional strain: the latest version of MyWork no longer functions on iPad 8 models, leaving staff reliant on mobile phones where new hardware had not yet been issued. This was described as unsustainable for extended inspections, with some teams resorting to personal devices and power packs due to delays in receiving new equipment. Staff emphasised the urgent need for new iPads with sufficient storage to support MyWork effectively. Signal and reliability issues created further operational delays. Teams reported slow loading times or complete application failures in certain locations. In one instance, an inspection was delayed by 45 minutes due to repeated application crashes and multiple identity verification prompts.
- 5.12 Training provision also undermined confidence in the system. Sessions were described as generic, focused on the previous version of the application, and limited in duration. In regions where drainage inspections are seasonal, training was delivered several months before the application was used, resulting in poor retention and reduced preparedness when the system went live. This reinforced the perception that training was not aligned with operational requirements. Data accuracy issues presented further barriers. Errors in node locations required manual repositioning of drainage items, slowing inspections. More concerning was the recurrence of deleted or corrected nodes, which reappeared months later. At sites in NW&C and W&W, assets recorded in MyWork did not align with datasets in STrEAM despite updates having been made. These inconsistencies reduced confidence in the system's reliability and created additional work for inspection teams.
- 5.13 Assurance challenges reflected similar concerns. Errors in asset location data highlighted the need for planning, while observations at renewal sites identified deficiencies in waterflow design and soil stability. Route teams reported limited authority to hold contractors accountable, constraining their ability to achieve self-assurance.
- 5.14 The drainage standard issued in September 2025 is expected to strengthen alignment between design outputs and installed assets by mandating performance-based solutions assessed against known flow rates and catchment areas. This represents a shift from like for like replacements towards future ready designs.

- 5.15 Extending MyWork access to contractors was viewed as essential in many regions to enable as built data to flow directly into Ellipse once approved by asset engineers.
- 5.16 Staff expressed concern about resourcing, stating they were struggling to keep pace with inspection and maintenance requirements and that FTE headcount needed review.
- 5.17 Training was discussed extensively, all drainage personnel are currently qualified to Level 1, but progression to Level 2 has been delayed due to a shortage of accredited trainers. Regional leads are now assuming training responsibilities to accelerate capability development. Staff also expressed a wish for drainage engineers to be present on site to check and assure works, as many workers felt less confident with management requirements and risk mitigation. A recurring frustration lies in the interface between geotechnical and drainage teams. Geotechnical specialists reported being asked to assume risks for drainage assets without sufficient input from drainage colleagues, emphasising that drainage risks are not always geotechnical problems. Clearer framing of issues (through risk categorisation and completed inspections) would improve collaboration. Embedding corporate knowledge and strengthening cross team communication are seen as vital steps to resolve these pressures.

Summary

- 5.18 Site visits demonstrated clear progress across drainage programmes, with evidence of improved planning, data informed decision making, and more sophisticated approaches to capacity management. Recent projects show a shift towards integrating flow monitoring, site knowledge, and catchment wide considerations, although legacy installations continue to reveal gaps where earlier designs did not account for fluvial and pluvial interactions. Operational constraints remain significant. Safe access to drainage assets is limited across much of the network, forcing many teams to rely on nighttime working or informal access routes. This has reduced visibility, increased risk, and challenged the assumptions underpinning existing planning processes. Regions are adopting tools such as What3Words to standardise access identification and improve risk control. Despite these constraints, teams are innovating. New technologies, including CCTV, dye testing, and RRV mounted jetting attachments are being deployed to improve safety and efficiency, with further rollouts planned.
- 5.19 The MyWork application continues to offer clear potential but is hindered by usability, reliability, and hardware limitations. Staff value the improved inspection forms and mapping capability, yet onsite data entry remains slow, device

performance is inconsistent, and compatibility issues with older iPads are disrupting inspections. Data discrepancies between MyWork and STrEAM, alongside recurring node location errors, are undermining confidence in system accuracy. Training provision has not kept pace with operational needs, particularly in regions with seasonal inspection cycles. Assurance activities highlighted further challenges, including inconsistent asset location data, design deficiencies at renewal sites, and limited authority for route teams to hold contractors to account.

- 5.20 The updated drainage standard is expected to strengthen alignment between design and delivery, promoting performance-based solutions. Regions are also trialling new data upload tools to address contractor access limitations, with early results showing promise. Resourcing pressures are evident across all regions. Teams report difficulty keeping pace with inspection and maintenance demands, uneven access to equipment, and delays in progressing staff to higher competency levels due to trainer shortages. Collaboration between drainage and geotechnical teams remains strained, with unclear risk ownership contributing to operational friction. Strengthening corporate knowledge and improving cross disciplinary communication are seen as essential.
- 5.21 Despite these challenges, staff engagement and commitment remain strong. Teams expressed pride in locating previously “lost” assets and in the positive impact of completed works on reducing delays. There is a clear appetite for improved planning, consistent management, and better aligned resources. Combined with emerging innovations and updated standards, this provides a solid foundation for building a more resilient, efficient, and future ready drainage management capability.

6. Conclusions

- 6.1 The MyWork application demonstrates potential, and is well regarded, however its impact is constrained by usability, reliability, and hardware limitations. While staff value the enhanced inspection forms, mapping capability, data entry remains slow and device performance inconsistent. Compatibility issues with older iPads, coupled with variable access to suitable hardware, are disrupting inspections and reducing confidence in the system. Data discrepancies between MyWork and STrEAMs, including recurring node and location errors, undermine trust. Training and development have not kept pace with needs, particularly with seasonal inspection cycles, leaving gaps that directly affect data quality and assurance.
- 6.2 These challenges are compounded by varied organisational structures across drainage and lineside functions. In several regions, multiple team models operate in parallel, creating unclear accountability, weakening stewardship, and complicating handovers. The absence of drainage teams in some areas has resulted in gaps in corporate knowledge. Responsibilities split across asset categories make effective management difficult. Staff highlighted resourcing pressures, delays in training, and governance gaps, including the lack of defined roles within RACI frameworks.
- 6.3 Drainage is often subordinated to parent assets such as the permanent way, leading to late identification of requirements in project design and inconsistent delivery. Handback processes remain uneven, data entry fragmented, and assurance activities constrained by limited authority for route teams to hold contractors to account.
- 6.4 Current KPIs and volumetric reporting provide a partial view of performance and can unintentionally penalise innovative or risk reducing interventions. These factors collectively restrict self-assurance and limit confidence that delivered works meet specification, represent value for money, and support long-term resilience.
- 6.5 New 2025 standards mandate performance based, future ready solutions aligned to flow rates and catchment characteristics. Data integration through platforms such as STrEAMs is beginning to break down silos, enabling lifecycle analysis, catchment mapping, and weather linked forecasting. Regions are adopting risk-based investment planning, climate resilient designs, and nature-based solutions, embedding more holistic thinking into infrastructure delivery. Scotland's structured data approach, planning, and climate resilience strategies provide a strong model for wider national adoption.

- 6.6 Staff engagement is an identified strength, and teams demonstrate pride in their work. There is enthusiasm for stronger governance, clearer standards, improved access arrangements, and consistent collaboration across routes and regions. Drainage management is evolving from a reactive activity into a strategic asset class.

7. Recommendations

7.1 This targeted assurance review has made six recommendations.

Recommendation 1: Handback Controls

To support compliance with Network Licence conditions (Conditions 1.1 & 9.4) on appropriate processes and systems, and to promote consistent asset management, Network Rail should consider the design and implementation of a National Handback protocol for drainage works.

Such a protocol would introduce a standardised handback process aligned with Earthworks, Track, and S&T standards. This could for example include verified as built drawings demonstrating flow and connectivity, photographic evidence prior to burial, in process test results, and formal sign-off by competent construction managers.

Early engagement of drainage asset owners (OTME and AOTME) through site walkouts, defect reviews, and formal acceptance would enhance accountability and strengthen assurance. ORR observed positive examples of this approach in the Wales and Western region, where effective practices are embedded. Building on this best practice an exercise could be undertaken to establish a national model that can be applied across all regions.

This measure would address concerns about inconsistent capability and handback processes, while supporting compliance with licence obligations, reducing drainage related risks, and enabling the safe, sustainable completion of works.

Responsible Lead – National Technical Head (Drainage)

Recommendation 2: Drainage Organisation Models

To support compliance with Network Licence Conditions 1.1, 2.4 and 3.2 on effective governance, capability and management systems, Network Rail should conduct an internal review to inform the development of a national best-practice drainage organisational model.

This review should ensure that Delivery teams are fully involved and should benchmark how drainage is organised across all regions, with the aim of defining a consistent operating framework covering roles, competencies, reporting lines, interfaces, and escalation arrangements.

ORR has observed examples of effective practice in regions such as Wales & Western and Scotland, where different organisational models have delivered good outcomes. These should be used to identify the features that most effectively support the safe and sustainable delivery of drainage works, aligned to clear RACI principles.

This approach would allow Network Rail to build on best practice, improve consistency across regions, and strengthen the management of drainage as a core asset.

Responsible Lead – Technical Authority Functional Audit Team

Recommendation 3: MyWork Application

To support compliance with Network Licence conditions (Conditions 2.4, 3.2 & 9.4) MyWork presents an opportunity to strengthen asset management, improve inspection accuracy, and support compliance with licence obligations. NR should review training and access arrangements for the MyWork system to improve staff confidence, data quality, and cross-route visibility. Training should reflect operational realities and include structured feedback loops.

Staff have highlighted its benefits in reducing reliance on paper records, improving condition tracking, and aligning asset data with StrEAMS inventories. To fully realise these benefits, the following areas should be considered for further development.

Access

- Explore options of integration between MyWork and StrEAMS to enable smoother data exchange and reduce duplication.
- Consider the need for an internal audit on app functional while on site, ensuring staff can use MyWork consistently across different environments.
- Consider restructuring work groups to improve cross boundary visibility, supporting more effective condition tracking and investment decisions.

Training

- Provide targeted training aligned with operational cycles, focusing on usability, data accuracy, and awareness of security risks.
- Encourage progression, helping staff to apply MyWork confidently in safety critical contexts.
- Offer ongoing refresher sessions and tailored support for frontline teams to build confidence in on-site data entry.

Responsible Lead - Head of Maintenance

Recommendation 3a: Hardware Review

To support compliance with Network Licence conditions (Conditions 1.1, 2.4 & 3.2) the intent of this recommendation is to ensure staff are equipped to use the MyWork application both on site and in the office, enabling accurate record keeping of asset health and condition.

To fully realise the Mywork benefits, appropriate hardware provision is essential. An audit of current equipment and provision of suitable hardware would improve safety, data security, and operational resilience.

Hardware

- Provide suitable, future proofed devices (e.g., iPads with adequate storage and processing capacity) to support reliable onsite data entry.
- Ensure devices are configured to manage the demands of MyWork, including integration with asset inventories and the storage of large datasets.

By embedding improvements in hardware provision, Network Rail can reinforce assurance, ensure inspections are delivered to standard, and align asset management processes with both regulatory requirements and frontline realities.

Responsible Lead – Infrastructure Maintenance Delivery Managers

Recommendation 4: Access Arrangements

To support compliance with Network Licence conditions (Conditions 1.1, 2.4 & 9.4) and strengthen asset management, NR should review how access for drainage and off-track inspections is planned and controlled. The review should evaluate reliance on informal access points, the safety and effectiveness of night-time inspections, and opportunities to formalise access to support daytime work and improve compliance.

Attention should be given to the impact of limited formal access points, as reliance on alternative entry routes and restricted track time constrains planning and inspection programmes. Formalising alternative access through additional gates and enabling works would allow more activity to be delivered during the day, improving assurance that inspections are completed in accordance with standards and within expected timescales.

By embedding access considerations into annual maintenance strategies at a strategic level, Network Rail would be positioned to ensure asset planning, inspection programmes, and operational delivery are evidence based, resilient, and aligned with both regulatory requirements and frontline realities.

Responsible Lead – Regional Safety, Health and Environment Directors

Recommendation 5: KPI framework

To support compliance with Network Licence conditions (Conditions 1.1, 2.4 & 9.4) on Information and Asset Management, Network Rail should develop a KPI framework that offers clearer visibility of asset condition, risk trends, and regional performance.

Current measures are limited and reactive, making it harder to prioritise drainage effectively. Introducing a balanced set of proactive and reactive indicators, supported by enhanced StrEAMS capability will enable more informed decision-making.

These new or additional metrics could integrate both proactive and reactive indicators to provide a balanced view of asset condition and operational resilience. Proactive indicators could include inspection completion rates, defect identification trends, work bank health, competency compliance, and asset data completeness. Reactive indicators could cover drainage related delay minutes, earthwork stability incidents, emergency interventions, and repeat defects. Taken together, these measures would enable Network Rail to monitor asset health more effectively, anticipate risks, and drive continuous improvement.

Responsible Lead – National Technical Head (Drainage)

Recommendation 6: Business planning and Key Volumes

To support compliance with Network Licence conditions (Conditions 1.1, 2.4 & 9.4) on Information and Asset Management, and to contribute to PR29 objectives, NR should review the KVL framework to ensure it reflects the full range of drainage activities, including off network work, nature-based solutions, and safety critical outcomes. A broader, more future focused approach would support innovation, fair benchmarking, and long-term resilience.

The current framework has a narrow focus, which means that important elements such as off network activities, nature-based solutions, and safety critical outcomes are not fully reflected. This can unintentionally encourage a focus on easily quantifiable outputs, while making it harder to prioritise risk reducing interventions or foster innovation that supports long-term resilience.

Responsible Lead – National Technical Head (Drainage)

Abbreviations and Glossary

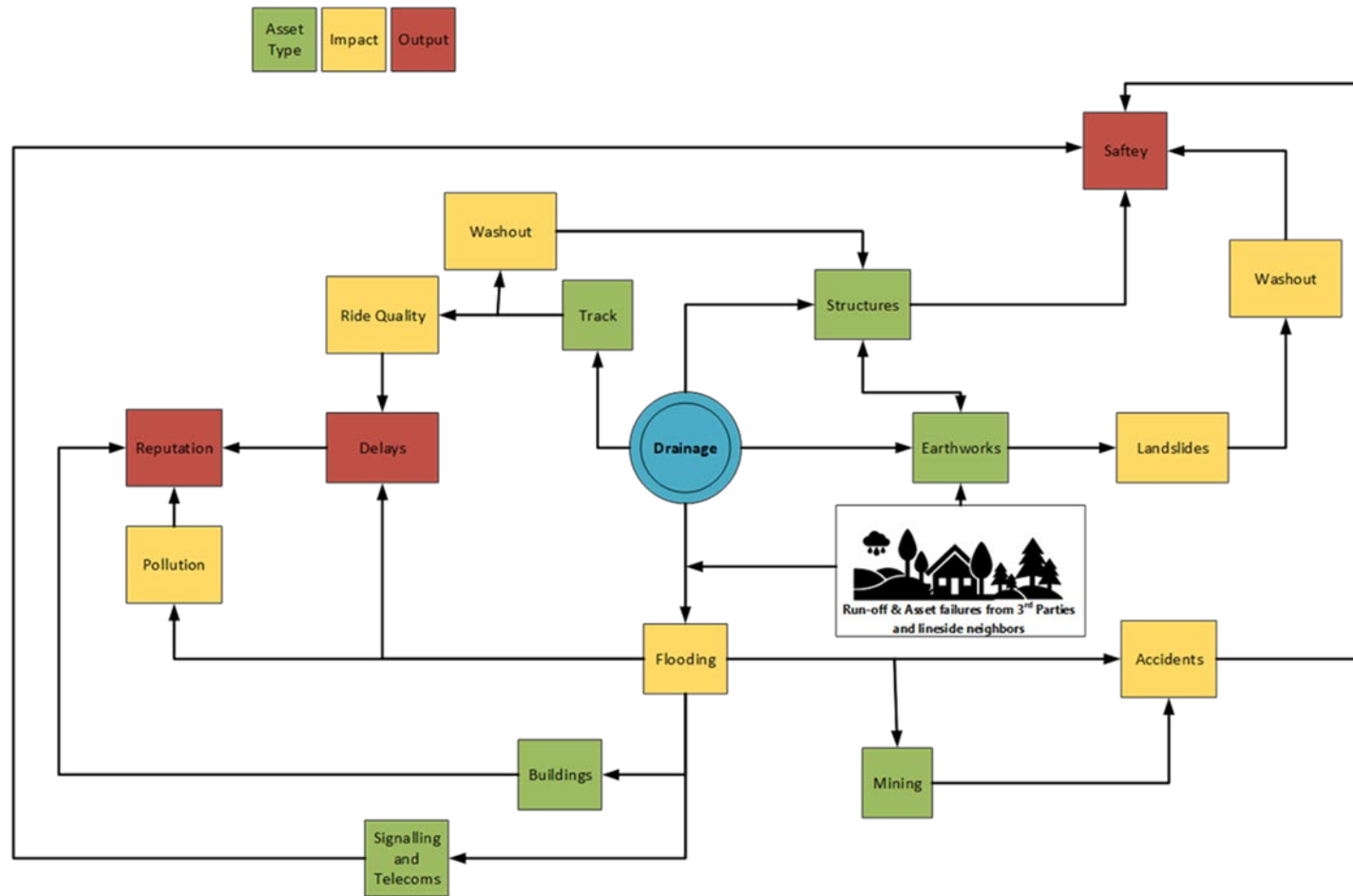
Abbreviation / Acronym	Description
AMP	Asset Management Plan process, used for planning and managing the railway's assets, specific standard, NR/L2/MTC/089, to manage the completion of construction stages, which is part of the broader AMP process.
CDM	Construction Design management regulation
CP	A control period (CP) is the period to which an access charges review (e.g. a periodic review) applies. Control periods are typically five years in length, but shorter or longer depending on what the regulator decides as part of the review.
CP7	Control Period 7 (CP7) is from April 2024 to March 2029.
CP8	Control Period 8 (CP7) is from April 2029 to March 2034.
DEAM	Director of Engineering and Asset Management.
DOT	Drainage and Offtrack
DU	Delivery units (DUs) are Network Rail's maintenance teams based in geographic locations across its network.
EER	Earthworks Examination Records
FAI	Fatal Accident Inquiry
FoS	Factor of Safety
FTE	Full-Time Employee, a unit of measurement that represents the number of full-time employees an organisation has, calculated by converting part-time hours into full-time terms
GARR	Geotechnical Asset Risk Rating

KCL	Key Cost Line
KPI	Key Performance Indicator
KVL	Key Volume Line
MDU	Maintenance Delivery Units
MST	Maintenance Scheduled Task
NFM	1. National Flood Management
NR	Network Rail
NW&C	Northwest and Central
ORR	the Office of Road and Rail
PoF	Probability of Failure
PR23	The 2023 periodic review of Network Rail (relating to CP7).
PR28	The 2028 periodic review of Network Rail (relating to CP8).
PWAY	Permanent Way, which refers to the railway track itself and the associated infrastructure, including the rails, sleepers, and ballast
RACI	Network Rail uses the RACI (Responsible, Accountable, Consulted, Informed) framework to define job roles and responsibilities
RAIB	Rail Accident Investigation Branch
RAM	Region/ Route Asset Manager
Region	Network Rail's five operating regions – Eastern, NW&C, Scotland, Southern and W&W.
RFI	Request for Information

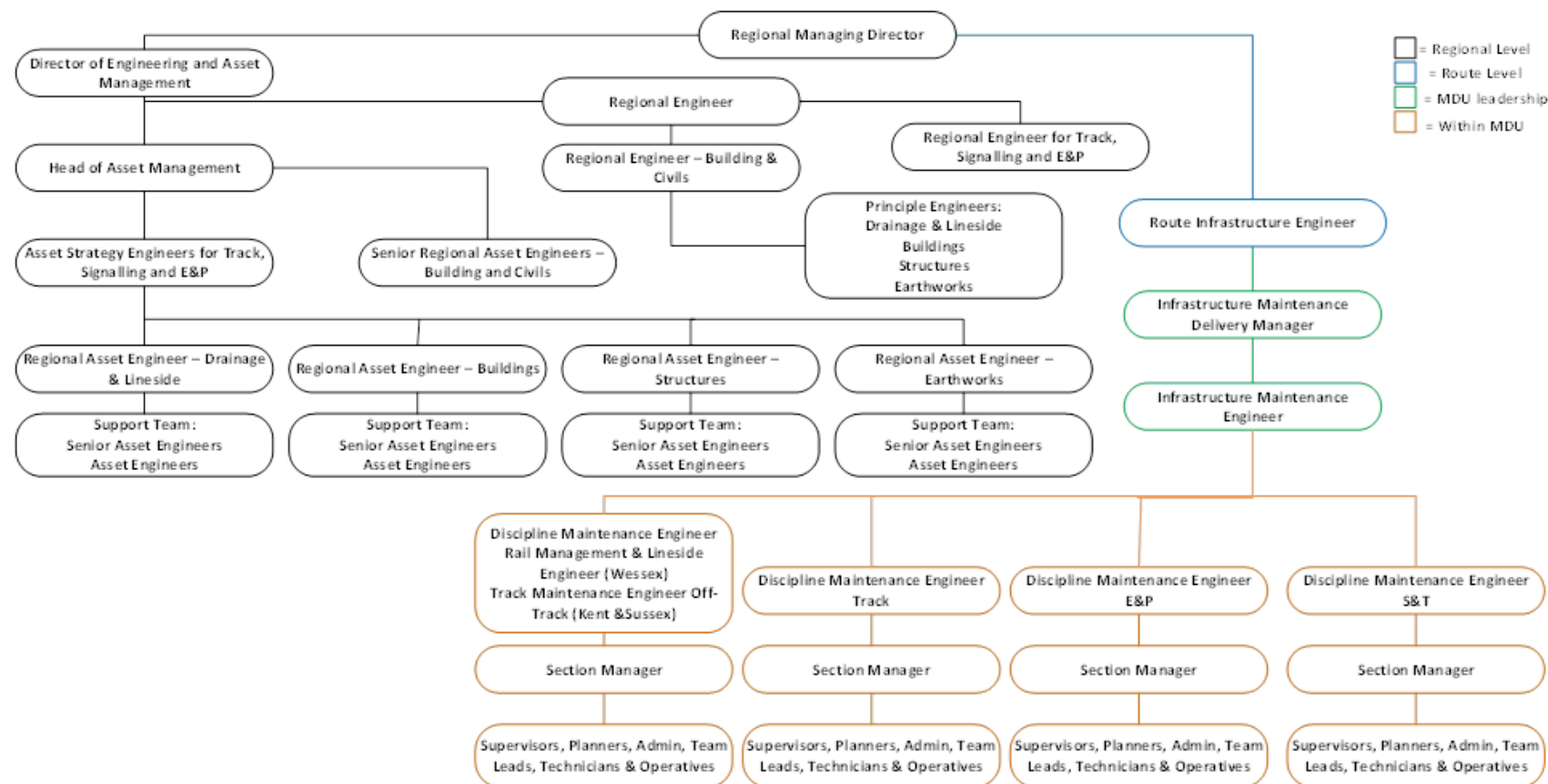
RSD	Railway Safety Directorate, an ORR department responsible for overseeing the safety of the rail network in Great Britain through inspections, accident inquiries, and setting standards to reduce risks and incidents
SCOTS	Scottish Collaboration of Transportation Specialists
SSRG	System safety risk group
StrEAMS	Strategic Earthworks and Asset Management System
SUDS	Sustainable Drainage Systems
TA	Technical Authority (TA) is a central business unit within Network Rail that, among other things, sets technical policies and standards for the routes, the System Operator, and the wider rail industry.
TAR	Targeted assurance review
TME	Track Maintenance Engineer
UK	United Kingdom
W&W	Wales and Western
WAIF	Work Arising Identification Forms
WODM	Weather Operations Delivery Manager

Appendices

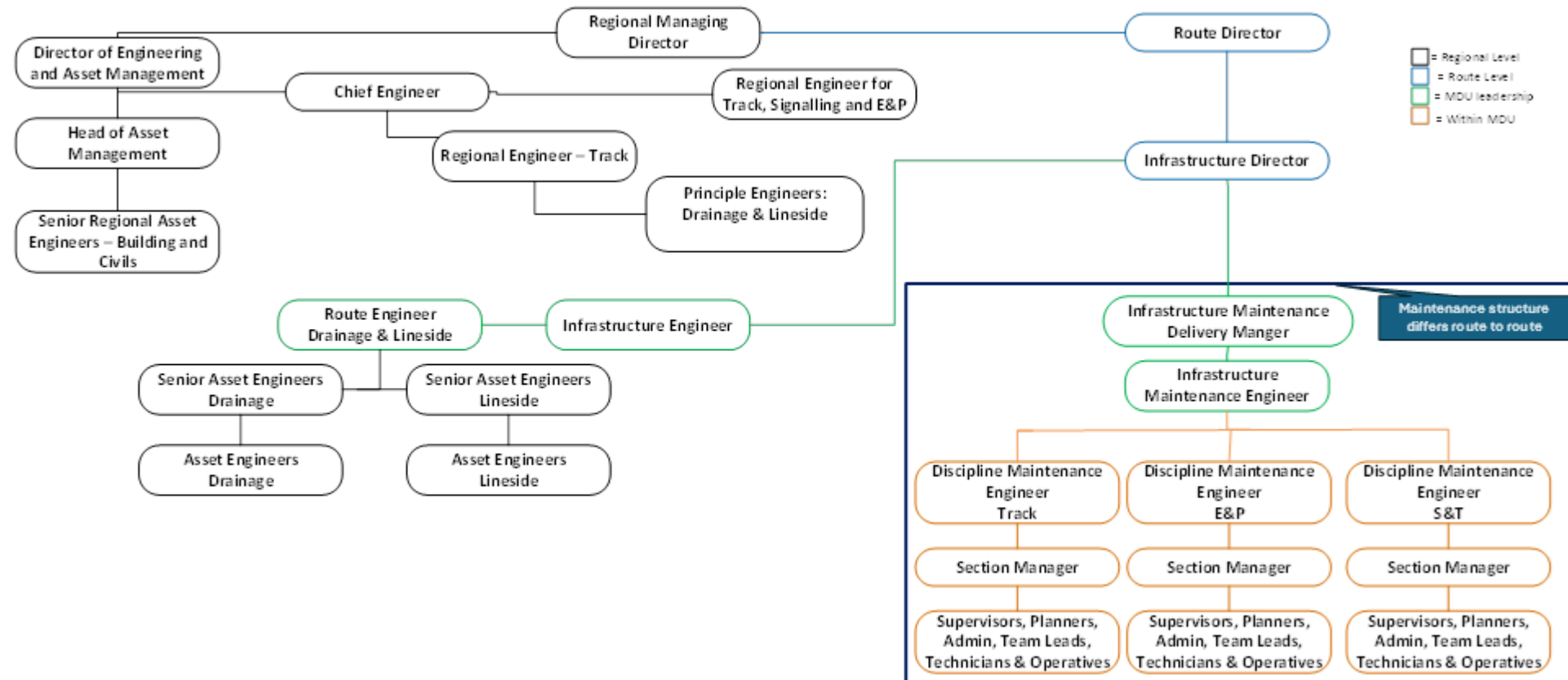
A. Graphical overview of drainage interdependencies with key railway assets



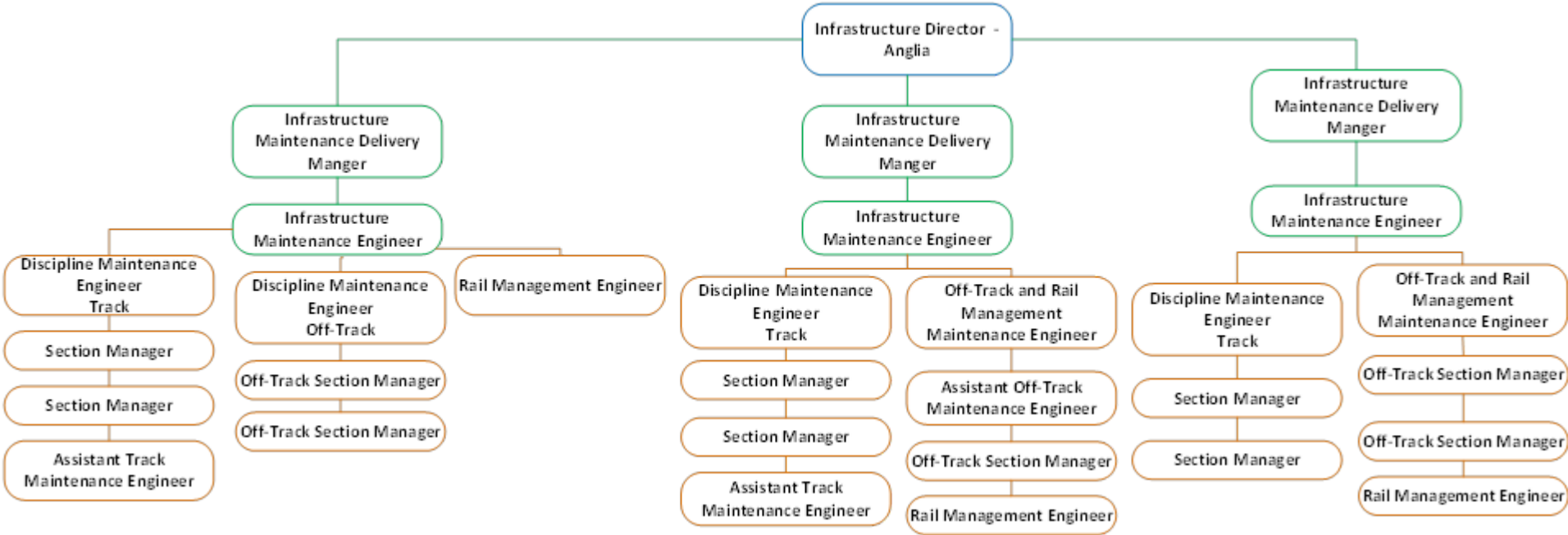
B. Southern Region Drainage Organisation



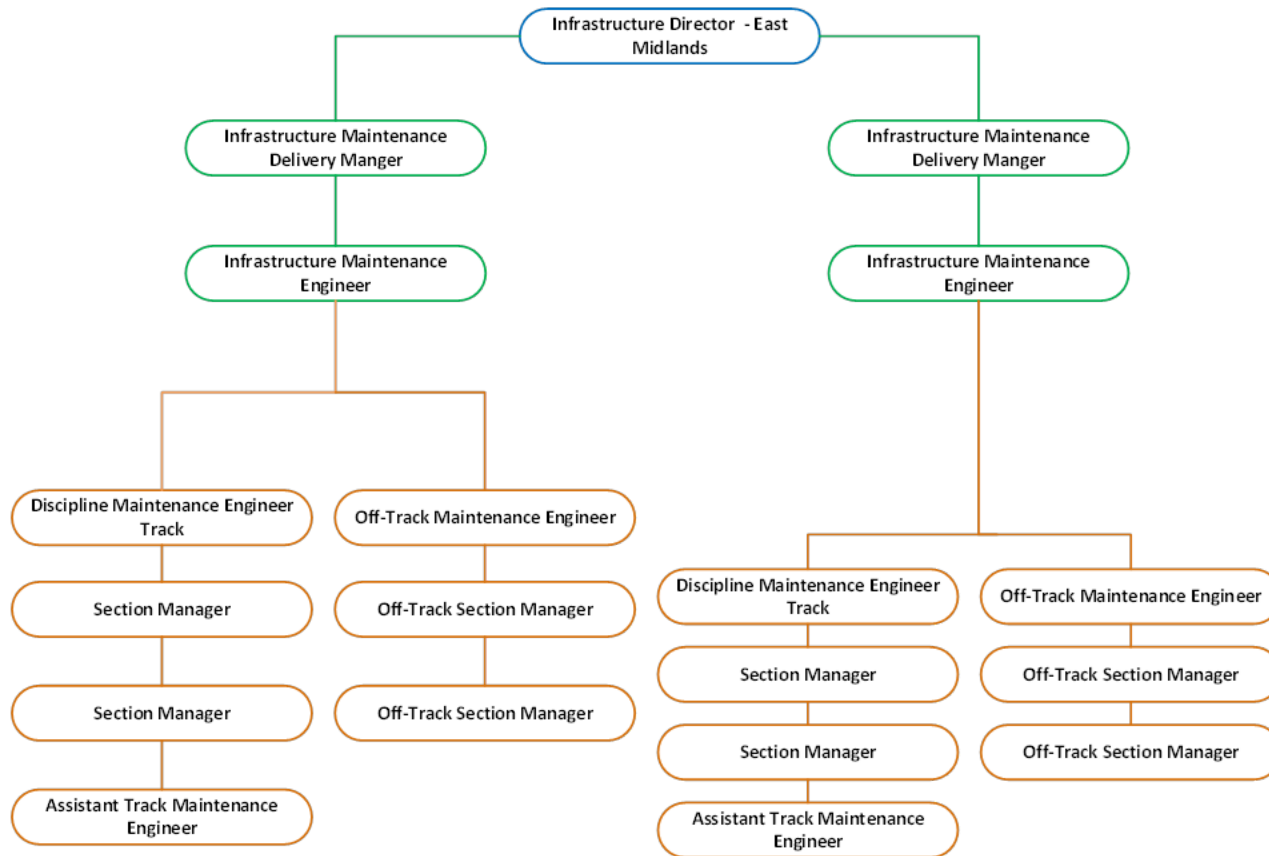
C. Eastern Region Drainage Organisation



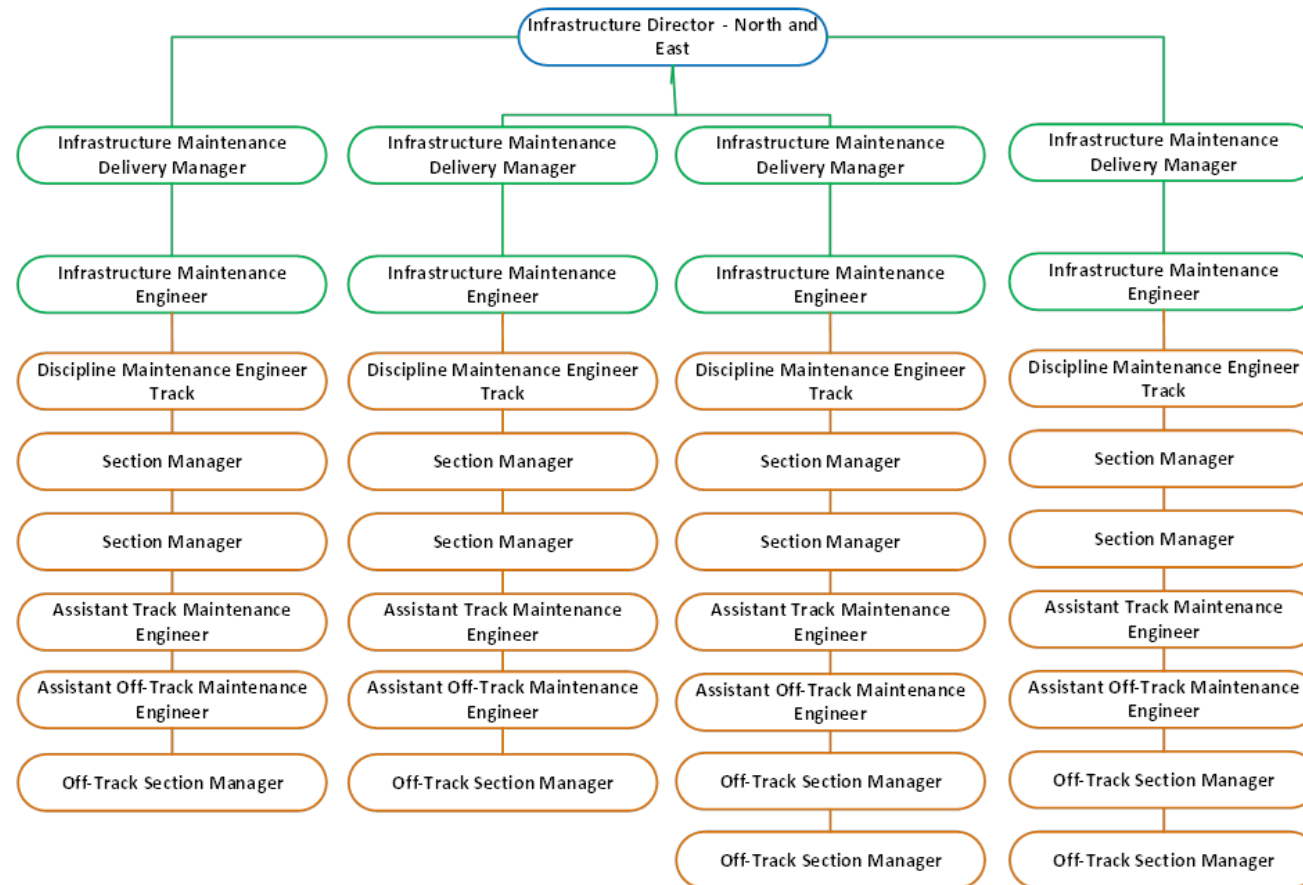
D. Anglia Route Eastern Region Drainage Organisation



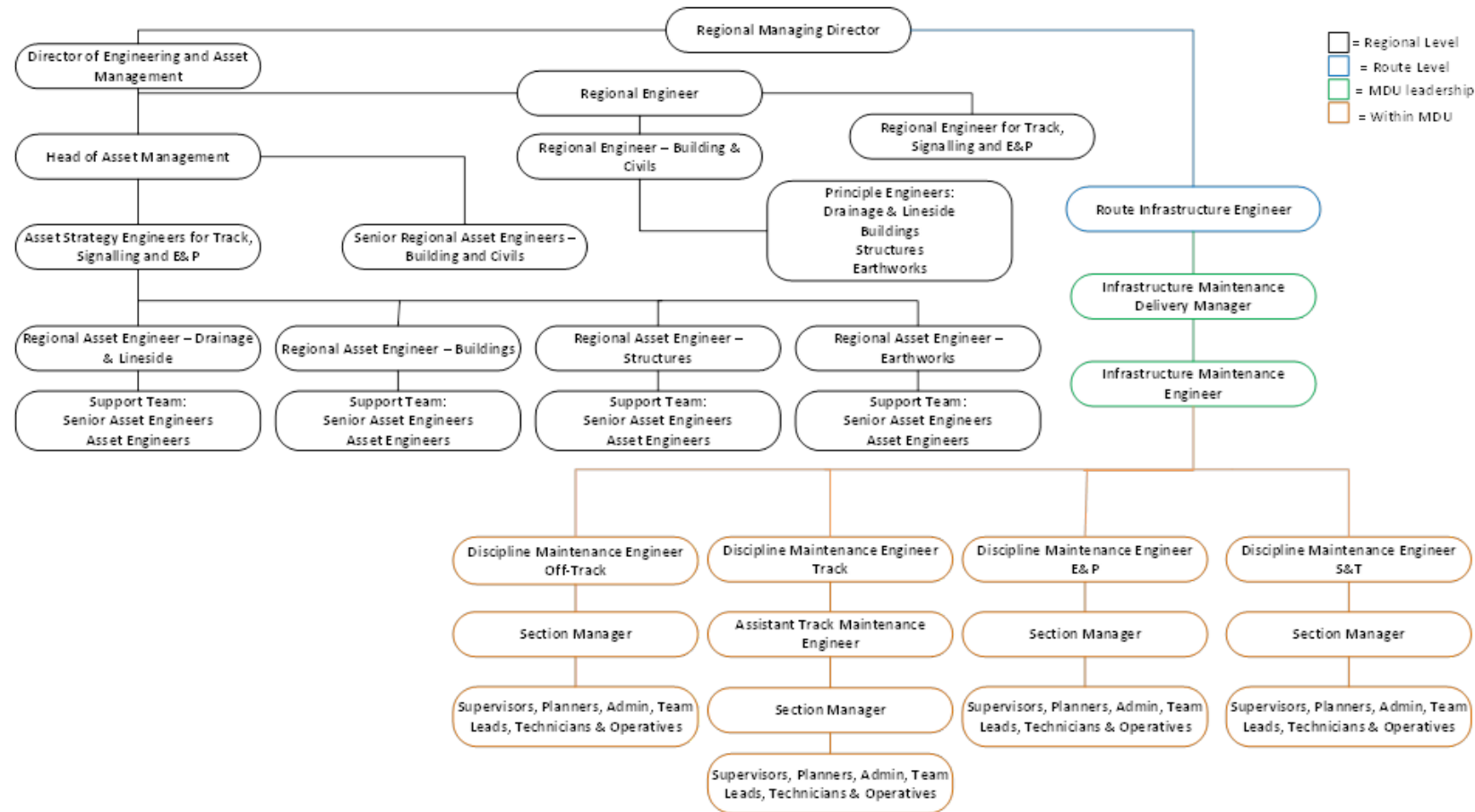
E. East Midlands Route Eastern Region Drainage Organisation



F. North & East Route Eastern Region Drainage Organisation

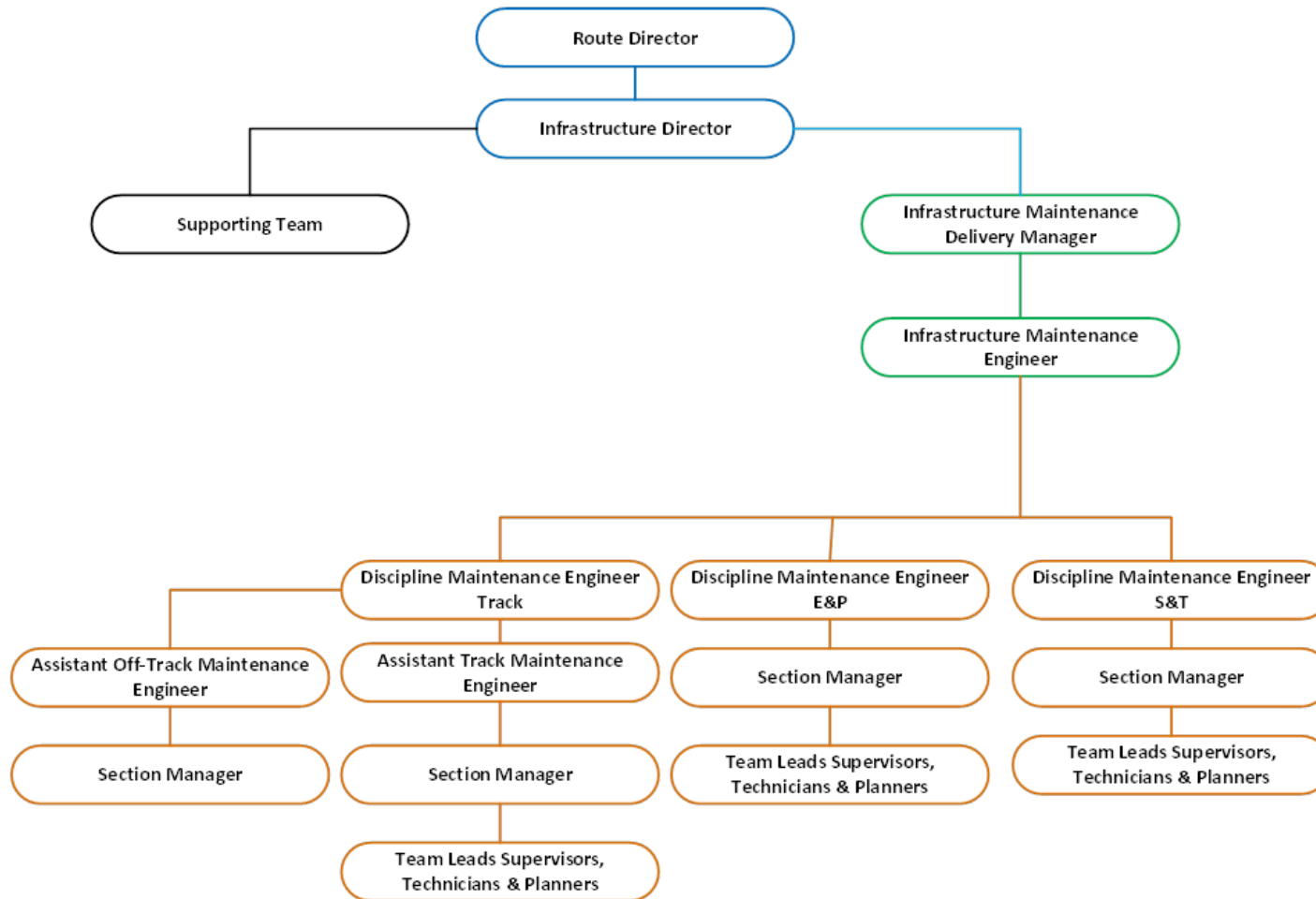


G. Scotland Region Drainage Organisation

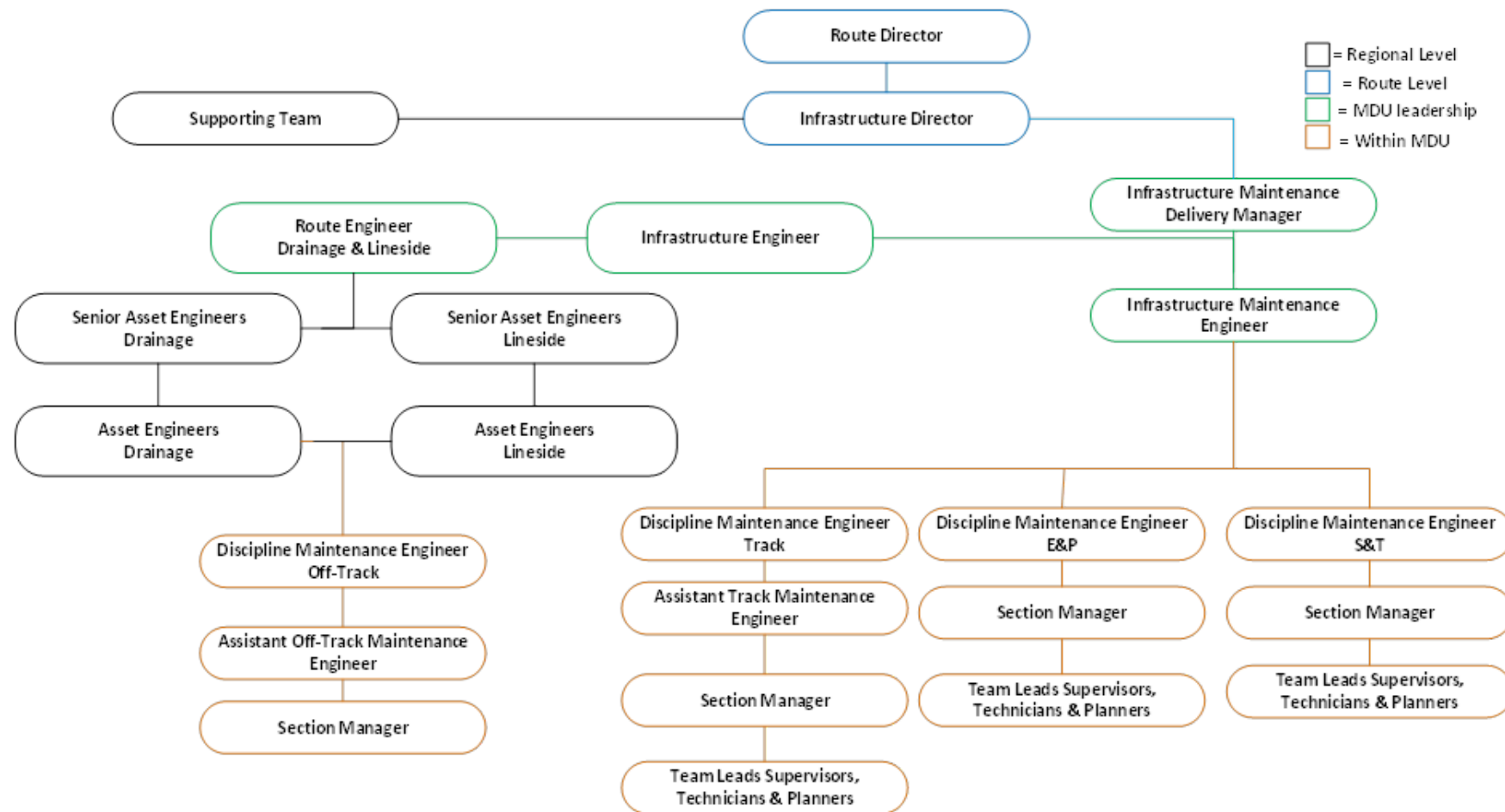




I. Central Route Northwest & Central Region Drainage Organisation



J. Northwest Route NW&C Region Drainage Organisation





© Crown copyright 2026

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit nationalarchives.gov.uk/doc/open-government-licence/version/3

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is available at orr.gov.uk

Any enquiries regarding this publication should be sent to us at orr.gov.uk/contact-us

