

DoW CoP bulletin

CL:AIRE's DoW CoP bulletins describe applications of the CL:AIRE Definition of Waste: Development Industry Code of Practice. This bulletin describes the use of a framework and staged declaration approach to Materials Management Plans on HS2 Align.

Copyright © CL:AIRE 2025.

Experience of using an MMP framework and staged declaration approach to MMPs on HS2 Align

1. INTRODUCTION

This bulletin describes the use of a framework and staged declaration approach to Materials Management Plans (MMPs) within the context of the CL:AIRE Definition of Waste: Development Industry Code of Practice (DoW CoP). This approach was taken on part of the High Speed 2 (HS2) infrastructure development which is being managed by the Align joint venture (Align JV¹).

HS2 will provide a new high speed rail link between London and Birmingham and comprises approximately 140 miles of track, stations, tunnels and bridges. The line is divided into three key areas (south, central and north) with these areas further broken down into sections. Align JV is responsible for construction of Section Central 1 (C1).

The HS2 Excavated Materials Management Strategy established the principle that excavated materials generated by the HS2 construction works should be reused wherever practicable. In support of this principle, the HS2 Materials Management Plan Framework sets out requirements that all contractors should follow during works which primarily include the use of suitable excavated materials via the adoption of the DoW CoP, including a requirement to prepare MMPs for all construction works comprising the reuse of excavated material.

The bulletin is set out as follows:

- Section 2 provides a description of Section C1;
- Section 3 sets out the main Align worksites relevant to the MMPs;
- Section 4 describes the MMP Framework including a discussion of the framework document and its establishment and development, long-term stockpile monitoring and the route-wide tracking system; and
- Section 5 describes the staged declaration approach, its evolution, lessons learned and benefits to the project.

¹ Align is a joint venture of three international and privately-owned infrastructure companies: Bouygues Travaux Publics, a subsidiary of Bouygues Construction; Sir Robert McAlpine, and VolkerFitzpatrick, a subsidiary of VolkerWessels.

2. SECTION C1 OF HS2

Section C1 of HS2 consists of a route of high speed rail infrastructure stretching 21.6 km across a predominantly rural area from Ickenham to the end of the Chiltern Tunnel in Buckinghamshire. Its key engineering features are the 16 km twin-bored Chiltern Tunnel and its five ventilation and intervention shafts and the 3.4 km Colne Valley Viaduct. The route plan for Section C1 is shown in Figure 1.

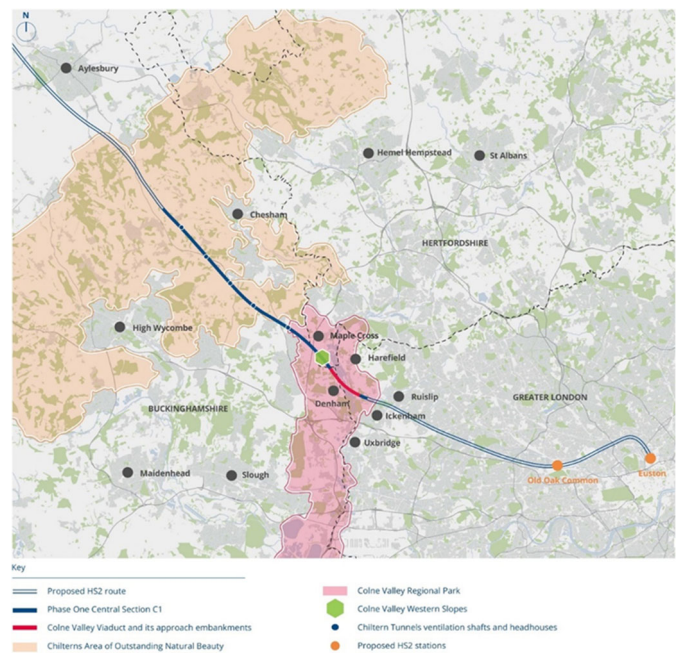


Figure 1: Route plan – Central section C1.

With regards to excavated materials management, the key area was located at the Chiltern Tunnel South Portal (also known as Western Valley Slopes) where a number of major earthworks are located and the treated excavated material from the Chiltern Tunnel was deposited. This area is particularly environmentally sensitive as it is adjacent to the Colne Valley Lakes Site of Special Scientific Interest and within a Source Protection Zone 1.

DoW CoP bulletin

3. ALIGN JV MMPS

While Section C1 is small compared to several other sections of HS2, it is relatively complex with regards to materials management due to the need to incorporate multiple geographically disparate sites and the reuse of a combination of natural, treated and contaminated excavated material in a highly sensitive environmental setting.

The main Align worksites relevant to the MMPs and key materials management requirements included in each document are shown in Figure 2 and described below (from south to north).

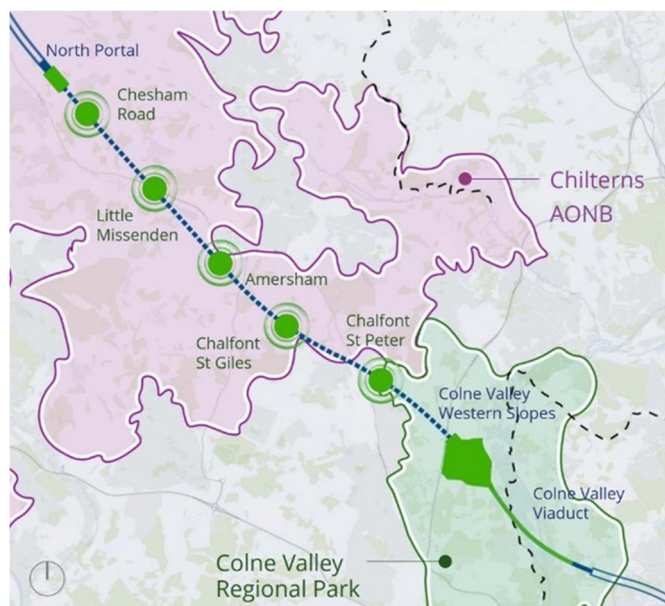


Figure 2: Main Align worksites.

3.1 Colne Valley Viaduct (CVV MMPs 1, 2 and 3)

Works in this area included piling for the viaduct piers, construction of cofferdams within the Colne Valley lakes and major earthworks associated with the Colne Valley South Embankment and Ickenham Auto Transformer Station. The pile arisings were treated under an Environmental Permit to add a drying polymer and transferred to the Western Valley Slopes for reuse; the use of this material was covered under the Western Valley Slopes environmental risk assessments and reused under the Western Valley Slopes MMPs. Due to a shortage of suitable material, clay was imported from the neighbouring SCS² area (Section S2) under a direct transfer MMP in order to construct the Ickenham Auto Transformer Station platform. Figure 3 shows the Colne Valley Viaduct in 2024.

3.2 Western Valley Slopes (WVS MMPs 1, 2 and 3)

This series of MMPs covered a number of major earthworks including the Colne Valley North Embankment, Tilehouse Lane Cutting, West Hyde Embankment and the South Portal Cutting. The area around the rail alignment was used for the placement of approximately 3M m³ of material from the Chiltern Tunnel; the chalk was excavated from the tunnel as a slurry and put through a treatment plant under permit to dewater and stabilise the material into a 'chalk cake' so



Figure 3: Colne Valley Viaduct (2024).

that it could be reused. Extensive laboratory trials were undertaken to characterise the chalk cake and formed the basis of a groundwater risk assessment that supported the placement of the material into the landscape. Research was undertaken by Align and Cranfield University to understand how the chalk cake could be utilised alongside other material to create calcareous grasslands – these trials lasted a number of years and included soil monitoring both off-site at Cranfield's laboratories and on-site at landscape trial planting areas to understand how different combinations of chalk cake, other aggregate and site won soils worked with regards to establishing chalk grassland environments. Upon completion of works at the Western Valley Slopes, 88 ha of calcareous grasslands will be created, which if successful will represent a significant proportion of chalk grasslands in the Chilterns area. Figure 4 shows an aerial view of the chalk cake placement.



Figure 4: Chalk cake placement.

3.3 Vent Shafts at Chalfont St Peter, Chalfont St Giles, Amersham and Little Missenden and Intervention Shaft at Chesham Road

These five sites are relatively compact and works included the excavation of the vent / intervention shaft and earthworks required for the head houses and associated landscaping. Due to limited space on the shaft sites, the vast majority of excavated material was

² Skanska Costain Strabag joint venture.

DoW CoP bulletin

transported to either the Western Valley Slopes or Colne Valley for reuse. The vent shafts (except Chesham Road) were constructed using a diaphragm wall and, similar to the Colne Valley pile arisings, the excavated slurry from the diaphragm wall was treated with a drying polymer prior to transport to the Western Valley Slopes for reuse (this material was also incorporated into the groundwater risk assessments for the Western Valley Slopes site). The Chesham Road site was constructed using caisson walls and therefore no slurry material was generated. Chalk material excavated from the shafts was transported to the Western Valley Slopes or Colne Valley where it was needed as engineering fill to form the key earthworks assets. Soils and small amounts of fill material were retained in stockpiles on the vent shaft sites for restoration. Figure 5 shows the Chalfont St Giles Vent Shaft under construction in 2024.



Figure 5: Chalfont St Giles Vent Shaft under construction in 2024.

3.4 Chiltern Tunnel North Portal

The works at the North Portal primarily comprised excavation of the tunnel portal area and improvement works required to strengthen the ground prior to the arrival of the two tunnel boring machines and landscaping of the North Portal area. This MMP was complex due to the interrelationship with works undertaken by EKFB³ (contractor for the neighbouring C2 area) with significant quantities of excavated material being transferred to EKFB under direct transfer. This required close co-operation between Align and EKFB's earthworks and MMP managers in order to track material and ensure documentation and declarations were consistent between the two contractors.

4. MMP FRAMEWORK

During the early stages of the project, Align agreed with the Environment Agency and CL:AIRE that Section C1 could be treated as one site for the purposes of the DoW CoP and on that basis adopted a framework approach to MMP management to enable the multiple Align MMPs to be linked together across a variety of separate sites. The use of a framework MMP system was developed from an outline strategy proposed as part of the Wylfa Newydd (Horizon Nuclear Power) project, which was similar to Section C1 in that it comprised a main site and a number of separate sites across Anglesey (e.g. Park & Ride, road improvements etc) between which it was proposed to share materials using the DoW CoP. The idea of a framework approach was essentially to have a series of site-specific MMPs 'controlled' by a framework document that links all of the individual MMPs together (but is not an MMP itself) so that the set up and operation of the framework could be easily understood. In addition, the framework approach also included a long-term stockpile monitoring protocol and a route-wide tracking system, which are described further in Sections 4.5 and 4.6.

4.1 Evolution of the Framework Document

Initially, the framework document was a detailed report containing a summary of each site-specific MMP including details such as anticipated material types, quantities and reuse proposals. However, it soon became clear that maintaining a document of this complexity was too time consuming and did not offer significant value to the engineering teams as they referred directly to the site-specific MMPs instead.

The document was therefore revised to become more of a 'ready reference' which provides readers with an oversight of the site-specific MMPs and their interlinks, and signposts to the MMPs and their verification reports if more detail is required.

In its final form, the framework document included:

- A brief description of each site-specific MMP within the framework and how the MMPs interact with each other (e.g. material from Chalfont St Giles was sent primarily to the Western Valley Slopes, with some small quantities sent to other vent shafts for engineering purposes);
- The status of the MMPs contained within the framework (i.e. proposed, in place, verified);
- Details of all declarations made and their declaration number;
- Document reference numbers to allow the reader to easily locate any particular MMP or Verification Report on Align's document control system; and
- Anticipated dates for completion and verification of each MMP.

The structure of the site-specific MMPs making up the Align MMP Framework is shown in Figure 6.

³ Eiffage, Kier, Ferrovial Construction and BAM Nuttall joint venture.

DoW CoP bulletin

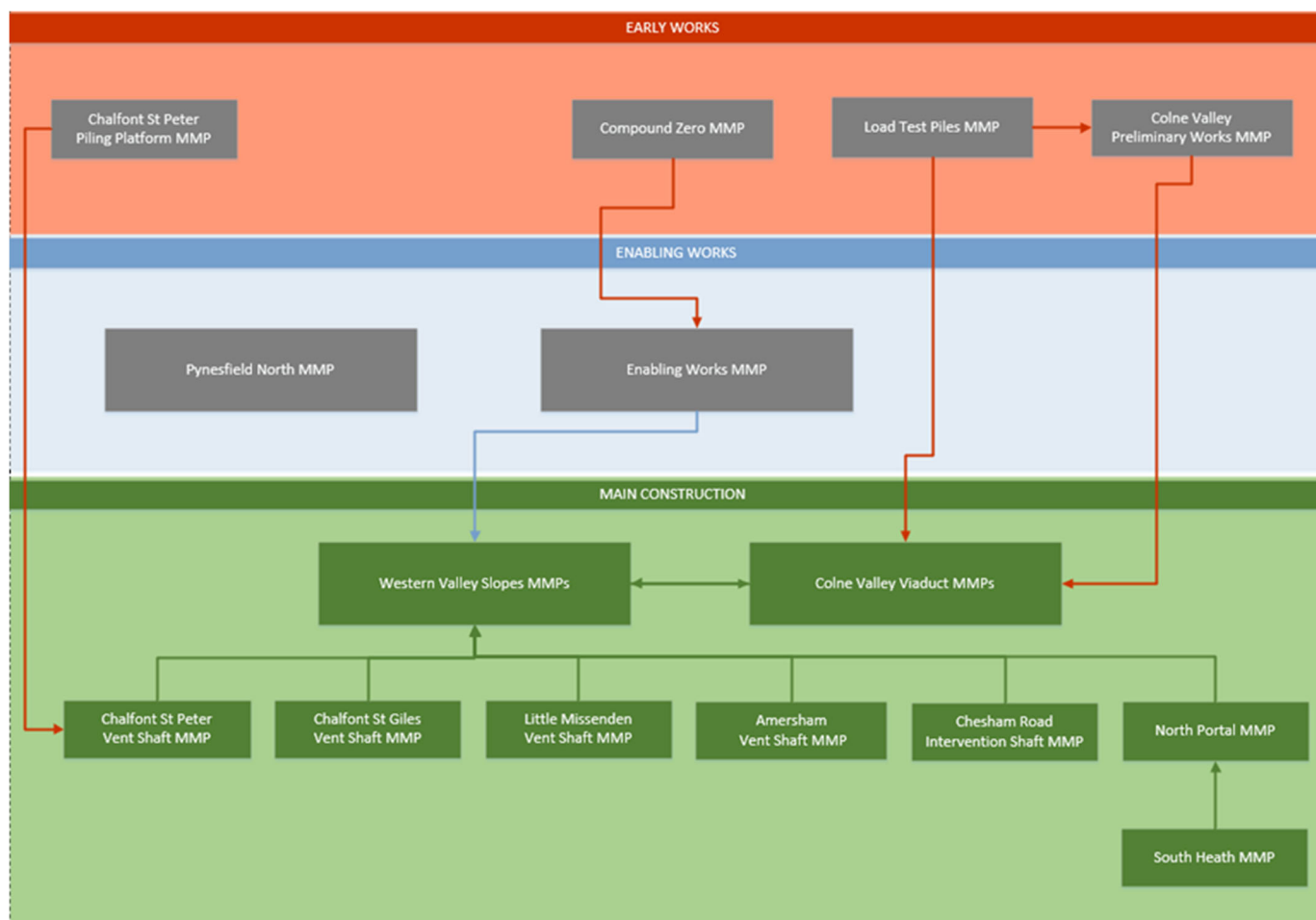


Figure 6: Flow Diagram 1 – Align MMP Framework.

As shown in Figure 6, the Align MMPs were divided into three key phases as described in Sections 4.2 to 4.4.

4.2 Early Works

The Early Works MMPs were small-scale, relatively short-term and were developed to support both early works i.e. Compound Zero (the first compound / office area at the Western Valley Slopes) or detailed design (e.g. Load Test Piles). Some of these MMPs fed into later documents, for example, Chalfont St Peter Piling Platform MMP was the precursor to the main works Chalfont St Peter Vent Shaft MMP. This stage of work was characterised by a need for flexibility as designs and requirements progressed – the use of a series of small-scale specific MMPs allowed better reactivity to engineering team requirements as it was often the case that a need for an MMP was identified at short notice with documentation prepared and MMP declared quickly.

4.3 Enabling Works

From an MMP perspective, the Enabling Works phase covered only the Western Valley Slopes; similar to the Early Works MMPs these MMPs were also relatively short-term in nature providing a basis from which the main construction MMPs could develop. The adoption of these short-term MMPs was driven by the need to allow time for the various environmental assessments and approvals to be completed that would enable the deposition of ~3M m³ of treated material from the Chiltern Tunnel – it therefore was not possible to

get the main construction works MMPs in place in time to support the start of enabling works and instead an ‘interim’ MMP (the Enabling Works MMP) was used to cover the site establishment in this period. While being only an interim document, this MMP still covered a substantial amount of earthworks and allowed for the stripping and stockpiling of topsoil and subsoil and regrading of the area to enable the development of the various industrial facilities required to support the construction of the Chiltern Tunnel.

4.4 Main Construction

The Main Construction MMPs typically came into force as the major works at each site commenced, or at the Western Valley Slopes once designs and environmental assessments were at the point that the longer term MMPs could be prepared and the Enabling Works MMP replaced.

At the vent / intervention shaft sites, MMPs were initially prepared to cover site installation and main construction works with an intention to prepare a separate MMP to cover final landscaping once designs were prepared. However, as it was found that these MMPs were subject to a number of updates as works progressed to cover issues such as transfer of material between shaft sites (not originally anticipated to be required, but found to provide a beneficial way to reuse material that would otherwise be sent for disposal) it was decided that rather than preparing a new MMP, a final update of the existing MMP would be made to cover landscaping works.

DoW CoP bulletin

Due to the scale and complexity of the Colne Valley Viaduct and Western Valley Slopes MMPs, they adopted a 'staged declaration' approach. Further discussion on this is presented in Section 5.

4.5 Long-term Stockpile Monitoring

Due to the long construction programme, the HS2 MMP Technical Standard guidance document sets out a requirement for the annual monitoring of long-term stockpiles to ensure that the material remains suitable for use and is still required for use. The Technical Standard provided a stockpile review template for use by all contractors.

Align undertook the monitoring of stockpiles via the following activities:

- An annual audit undertaken by a person who was competent to assess the continued suitability of the different material types (for some sites more than one specialist was required e.g. a soils specialist and an engineer who was competent to assess fill). The audit included all stockpiles which required review i.e. those present for >1 year;
- Consultation was undertaken with the designers to confirm that the stockpiled materials were still required. Confirmation of the intended reuse location and purpose was obtained; and
- If the review identified any material found to be either unsuitable for its intended use, or surplus to requirements, options for off-site reuse or disposal were identified, and a plan put in place for its removal.

Using the outcomes of the site audit, a report was produced detailing the findings including provision of a spreadsheet containing all stockpiles audited which recorded the following information:

- Stockpile ID;
- Stockpile location;
- Stockpile start / end dates (or expected end dates);
- Material origin and final destination;
- Material quantity;
- Material type;
- Relevant MMP and document number and material reuse type (e.g. site of origin, direct transfer);
- Whether contamination is suspected based on audit observations; and
- Confirmation that all four DoW CoP principles are met.

The reports were produced annually and are held on the Align document control system. The reports form part of the MMP verification process and are included as appendices in the verification reports.

4.6 Route-wide Tracking System

Align adopted an Excel-based tracking system utilising daily records produced by site teams which were input into a monitoring spreadsheet by the site supervisor or a member of their team.

During the early works stage, a tracking spreadsheet was held individually for each site-specific MMP as minimal interactions with other MMPs were required. However, once main construction got

underway it was quickly found that a more comprehensive tracking approach was needed that allowed for easy monitoring of materials movements between sites and which allowed for progress against declaration totals to be easily monitored. As a result, a revised spreadsheet was produced which incorporated all individual site-specific MMP tracking sheets into one master document. A series of pivot tables were prepared which provided summaries of key factors such as:

- Progress vs declaration total, including a colour coded trigger for quantities within 10% of the declared total or exceeding the declared total;
- Material sent to stockpile;
- Material transferred between sites within Section C1; and
- Material sent off-site.

The tracking data can be filtered to be specific to individual MMPs, to include groups of MMPs or to include the entire Align MMP framework. In addition, several table templates were prepared that can be imported directly into the verification reports which improves efficiency and consistency across those documents.

4.7 Benefits of a Framework Approach

The main benefit of the framework has been the flexibility it has introduced to the MMP process which has been critical when dealing with a large-scale, complex and long-running project. At the early stages of work as designs were ongoing, there was a need to utilise smaller scale / easy to implement MMPs at relatively short notice. These were tracked within the framework, and their interlinks with later MMPs easily understood via the framework document which allowed for materials excavation and reuse to be monitored. Another major benefit was the ability to track materials movements for all MMPs in the framework together, which allowed for the quick and easy review of progress at each site, the ability to review the transfers of material between sites and the review of the quantity and type of stockpiled material at each site.

Other key benefits include:

- Transparency for the regulators with regards to the purpose, progress and status of the MMPs within the framework and assurance their progress was being monitored and updated;
- Easy understanding of how the various MMPs interact with each other for those new to the project or not closely involved with the MMP work; and
- Direct link to the Align Environmental Management System, within which the Framework document was included.

5. STAGED DECLARATION APPROACH

As noted above, the MMPs for two of Align's areas – the Colne Valley and Western Valley Slopes – were complex and long running and at an early stage of the project it was realised these areas would require a more novel approach to MMP setup. As detailed design information was not available for all stages of construction at the point that the main construction MMPs needed to come into force, discussions with CL:AIRE and the Environment Agency identified the potential to use a 'staged declaration' approach, whereby the MMPs would be declared in stages to allow them to reflect ongoing design progression.

DoW CoP bulletin

Initially the staged declarations followed an annual update approach; each MMP was prepared and declared to cover its first year of operation with a new MMP prepared to take over from the old MMP at a specific point in time. The way this approach was envisaged to work is set out in Figure 7.

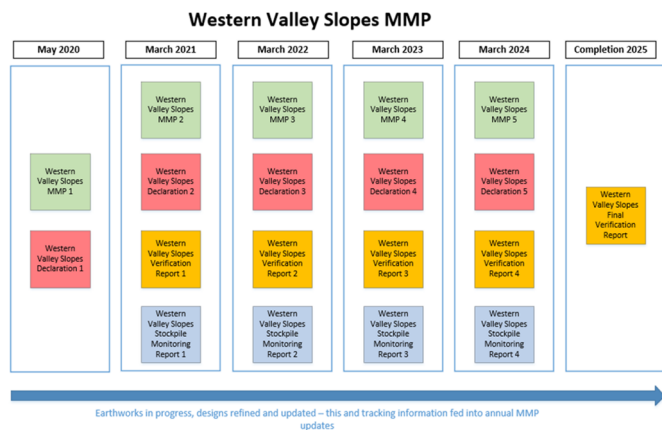


Figure 7: Initially proposed approach to staged declaration MMPs.

In addition to the annual scheduled update and declaration, the Environment Agency requested that a 10% trigger was placed on declarations such that if materials reuse was found to be close to or exceed 10% of the declaration total then a new declaration would be required. This was found to be necessary on one occasion, when the Western Valley Slopes MMP 2 exceeded its declared total by >10%.

Once the new MMP was in place, the previous version was verified – this process was aided by having the centralised tracking system which enabled both clear definition of materials movements under individual MMPs and also the ability to easily review material movements from other sites (e.g. Chalfont St Peter Vent Shaft to the Western Valley Slopes), and to link those movements to the specific MMPs being verified. A common template was used for verification, including standard tables output by the tracking system as discussed in Section 4, which aided the delivery of consistent reports.

As works progressed through the first annual update (from CVV and WVS MMP 1 to CVV and WVS MMP 2), it became clear that an arbitrary stop / start of MMPs was virtually impossible to accurately reflect in reporting due to the complexity of works ongoing at the various major earthworks assets. As a result, a revised approach was adopted whereby the declaration of major assets (e.g. Colne Valley North Embankment or West Hyde Embankment) was made in full at the start of works on that asset. Therefore, as each new MMP was prepared, assets scheduled to commence construction during the time period covered by the MMP were included in full even if the works would extend over a number of years. For example, works could commence on an asset under the CVV MMP 2 and continue through into the time period covered by the CVV MMP 3 but the full declaration for that asset would be made within CVV MMP 2. In addition, the timing of the annual updates was made more flexible and were programmed around construction works / commencement of major assets to allow a more logical MMP update process.

With these amendments, the staged declaration process was found to work well as a way to apply the DoW CoP to the main areas of construction for Align.

5.1 Lessons Learned

Some of the key lessons learned from the design and implementation of the staged declaration approach were:

- To remain flexible in the approach and vary if the project requires; the approach defined at the project outset would have led to the process becoming very difficult to manage, therefore the ability to alter the process to make it more efficient was key;
- A centralised tracking system with readily reportable outputs and clear and easy ways to monitor material movements both within and between sites was critical to the monitoring of the MMPs and also to provide regulator confidence that DoW CoP was being properly applied; and
- Common templates for reporting to aid efficiency and consistency across the various Align sites, this aided internal delivery and approvals but also allowed any commentary from CL:AIRE audits or Environment Agency inputs to be easily included in all upcoming reports.

5.2 Benefits of a Staged Declaration Approach

Once the approach to staged declarations had been revised to make it more workable alongside the commencement of major assets, the approach worked well to provide a more manageable way to deliver large and complex MMPs over long timeframes.

Some of the key benefits of a staged declaration approach were found to be:

- Design changes were able to be incorporated into the MMP process more easily via the regular MMP updates so that the MMPs remained more relevant to the works in progress over the duration of the construction programme;
- Ongoing verification allowed for a quicker identification of issues, this was supported by a quarterly sense check of progress vs declaration totals to make sure the 10% threshold was unlikely to be exceeded;
- Minimisation of the risk on long-duration projects of knowledge being lost due to staff turnover, regular verification meant that knowledge holders were usually able to contribute to the verification reports (e.g. earthworks managers who were aware of why certain changes occurred); and
- The individual MMPs were less complex than would have been the case if one MMP had been produced for the whole of the Western Valley Slopes or Colne Valley.

ACKNOWLEDGEMENTS

With thanks to Carl Baker, formerly Align JV and Chris Cantle, Align JV & Jacobs UK Ltd for their help in preparing this case study.

For further information please contact Karen Young, AlignJV:
k.young@alignjv.com / karen.young@jacobs.com