

EFFECTIVE ASSET MANAGEMENT

Asset Management is more than managing the condition of the asset through effective maintenance. It also includes managing the use of the asset to meet the transport needs of the community. It covers managing the use and maintenance of the road surface and all the facilities and services within the boundary of the highway plus public transport facilities and public car parks.

Effective asset management is vitally important to delivering all of the Shared Priorities and LTP2 Objectives.

In its simplest terms the highway is an asset which enables journeys to be made. It is a transport asset and there is no intention of producing a Highways Asset Management Plan separate from a Transportation Asset Management Plan (TAMP). Rather the TAMP will encompass highway asset management along with other transport assets such as bus stations, car parks, etc.

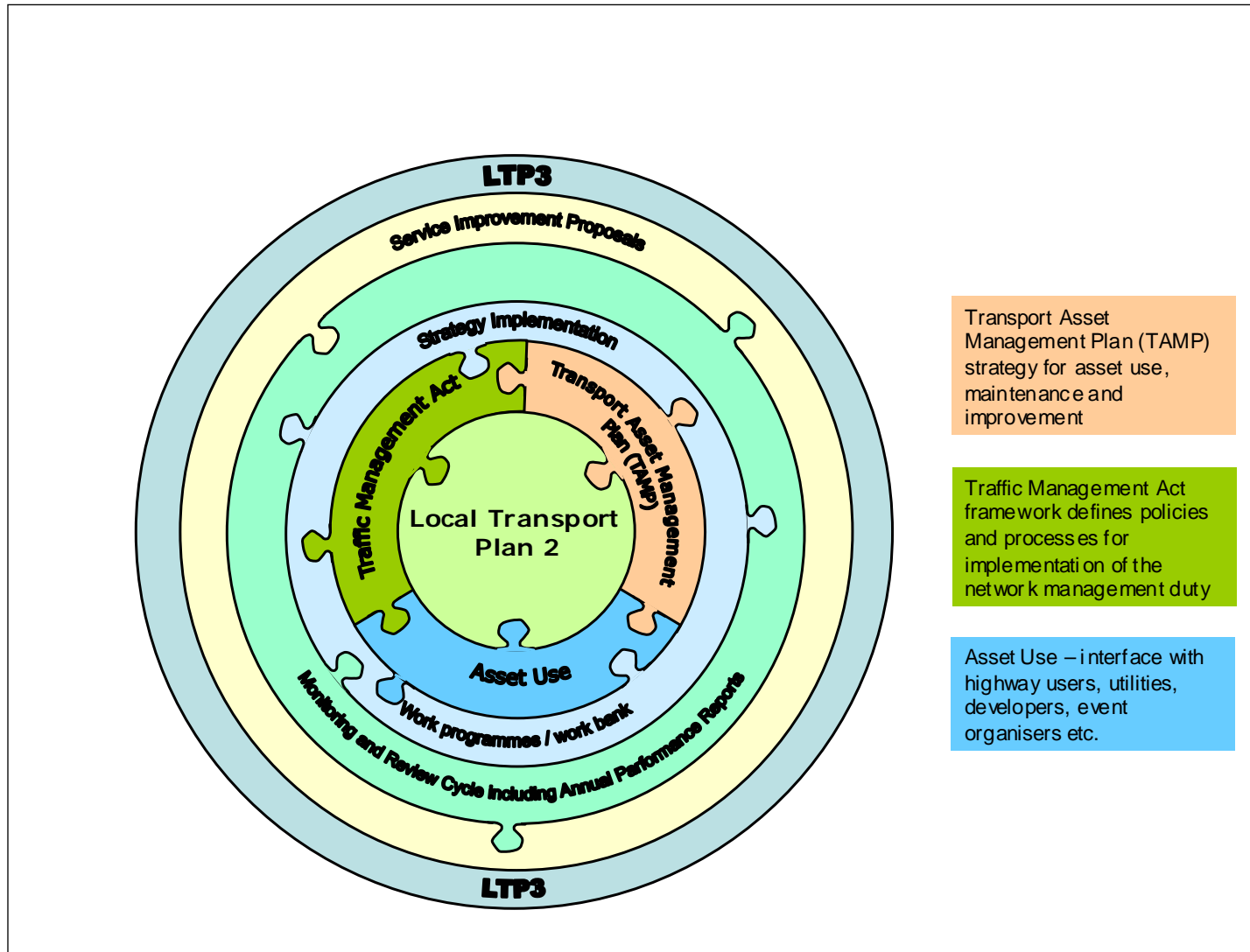
Appendix I, Table I.1 shows the actions, common to all districts, which are a part of our TAMP development plan ('gap analysis') with a target objective for the end of the LTP2 period ('planned for 2011'). This effectively shows how we will use the TAMP process to improve our approach to the determination of priorities for how the

asset is used (e.g. traffic management), maintained and improved.

There is a very close relationship between the TAMPs and LTP2 with each complementing and informing the other and sitting together with other relevant documents and strategies as illustrated in figure 2.21.

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Figure 2.21 Relationship between Asset management /Traffic Management Act/ and Local Transport Plans



THE CHALLENGE

The physical appearance and condition of streets and public transport infrastructure has a significant impact on people's quality of life. It can impact on people's perceptions, attitudes and behaviour.

The challenges for the Partnership to address in LTP2 are:

- a high proportion of streets still need significant works to bring them to a satisfactory standard;
- bridges need strengthening to carry 40 tonne lorries;
- a backlog of maintenance to structures as most funding in recent years has been spent on strengthening bridges and walls;
- kerbs and footways are persistently damaged by vehicles overriding and parking;
- utility excavations have a major impact on ride quality and asset life, around 64,000 holes are dug in West Yorkshire each year;
- excessive rainfall is straining a highway drainage system that was not designed for the current levels of development and is increasing the risk of flooding and subsidence;
- flash flooding of watercourses is damaging highway structures;
- cyclists and motorcyclists are particularly susceptible to poor quality and badly cleansed road surfaces;
- poor quality of footways, litter, dog fouling, puddles and ponding discourages walking;
- ageing street lighting infrastructure is reducing lighting performance and increasing the risk of column failure;
- signal controllers, traffic signs and road markings that are at the end of their life with risk of local congestion and accidents;
- vandalism particularly to walls, bus shelters, bus timetable cases, road and ROW signs and lighting columns strains resources and spoils the appearance of the area;
- maintenance of public transport assets has to be funded from the integrated transport block allocation rather than maintenance funding, reducing funds available for improvements;
- the high potential liability related to claims for slipping and tripping accidents and damage to vehicles; and
- the need to make best use of all the existing assets in a cost effective and planned way.

As resources are finite there needs to be a balance struck between the three competing demands:

1. safety – reactive maintenance to remove hazards e.g. filling pot holes;
2. addressing the maintenance backlog – tackling the worst problems first; and
3. preventative maintenance – timely planned maintenance to prevent deterioration.

Consultation

The state of the roads, pavements and cycle lanes was the second highest ranked problem identified in public consultation for LTP2, being identified by 38% of respondents (the highest was congestion at 59%). It was also a key issue raised by people in most of the local consultation exercises.

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WHERE WE ARE NOW

Condition data for roads indicates that the highway network is no longer deteriorating and the principal roads show an improvement. However, a high percentage of streets still need major works to bring them up to a satisfactory condition. Bridge data shows a slight decrease in the condition of highway structures over the last 12 months

Monitoring of the condition of our roads and bridges has shown that:

- 35% of the total length of Principal roads required treatment in 2004/05 (That is roads triggering investigatory levels - Best Value Performance Indicator (BVPI) 223);
- 13% of the total length of Non-principal roads required treatment in 2004/05. (That is roads triggering investigatory levels - BVPI 224a);
- 20% of the total length of Unclassified roads required treatment in 2004/05 (That is roads triggering investigatory levels - BVPI 224b);
- 19% of the total length of the most important (Category 1& 2) footways required treatment in 2004/05 - BVPI 187);
- the number of structures requiring preventative or essential maintenance

increased from 59% at March 2004 to 62% at March 2005;

- 210 bridges at March 2005 needed strengthening to carry 40 tonne lorries; and
- 2.3% of district authority owned structures at March 2005 had weight and/or width restrictions because of assessments of insufficient strength to carry heavier vehicles.

The monitoring regime for roads has been changed a number of times in recent years partially as a result of introducing new technologies. This means that the current measure of condition is not compatible with that used at the start of LTP1.

Although assets are inspected and assessed on a regular basis and remedial action taken where necessary, for some of our assets there is no formal measurement of condition. As part of the Asset Management Plan process (see below) more rigorous measurement processes will be introduced together with better planned programmes of repair and renewal.

If we do not continue to maintain our assets or allocate sufficient resources to maintaining them there will be a general deterioration in condition. This will lead to poor driving, cycling and walking conditions, an increase in road casualties and crime, and a general deterioration of the appearance of the area. In some instances e.g. highway structures or

lighting columns, the deterioration could lead to potentially catastrophic failure leading to serious injury or death.

WHERE WE WANT TO BE

Objectives

Our objectives for Asset Management reflect where we want to be. They are:

- **To improve the condition of the transport infrastructure; and**
 - To manage the infrastructure more effectively.
 - To meet the needs of current and future transport users.
 - To mitigate and adapt to the effects of climate change.

Over the period of LTP2 the Partnership will be developing TAMPs that will:

- assess the demands for the use of the elements of the infrastructure;
- enable the best use to be made of the existing and any new infrastructure;
- provide a process for the most cost effective maintenance regime; and
- within available funding, ensure that assets are maintained in a condition that is 'fit for purpose'.

LTP2 will inform the development of TAMPs, especially as it relates to consultation outcomes and user aspirations. The consideration already given to the plans has influenced the content of LTP2, drawing together all aspects of asset management to give a

holistic and co-ordinated approach to strategy development.

THE ASSET MANAGEMENT PROCESS

Asset Management Plans

In June 2004 the *Framework for Highways Asset Management* was published by the County Surveyor Society (CSS). This encouraged highway authorities to develop a strategic approach to highways asset management.

However the five districts had already implemented the recommendations of the code of practice CSS's "*Delivering Best Value in Highway Maintenance*" and produced policy statements, asset management plans and maintenance plans in various formats.

The five highway authorities are using the codes of practice for highways, structures and street lighting to review current procedures, document good practice and develop action plans in combination with the CSS Framework for Asset Management to build upon earlier work.

Metro has for a number of years been using an asset management process more suited to public transport operations.

Figure 2.22 shows current practice and its relationship with the LTP/TAMP.

TAMPs will address both the condition of the highway network and the public transport infrastructure assets and will have strong linkage with maintenance and integrated transport programmes funded through the LTP2. They will cover demand

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aspirations and will challenge whether the right asset is being provided to enable the public to use a transport network that has adequate capacity, is safe, available to use and matches aspirations.

Officers from the authorities are actively engaged in relevant Regional and National Working Groups and share knowledge, best practice and ideas locally. Also there are well established relationships in divisions within local authority, neighbouring authorities and other stakeholders. All this work has helped to inform the LTP and authorities will build upon this work to develop TAMPs.

Developing TAMPs will produce:

- a longer term view of planning and programming;
- modelling to create the best whole life options for the asset;
- greater use of asset performance indicators to inform decisions; and
- explicit consideration of customer expectation and documentation of levels of service.

Figure 2.23 identifies the relationships between the various elements of the asset management process.

Transport demands

One of the challenges is assessing the transportation demands for assets. Authorities need to ensure that they can

achieve best utilisation of the assets but there are usually competing demands e.g. through traffic on a road in a shopping centre is in conflict with pedestrians and affects the general amenity of the area. One method being investigated is a variation of a road hierarchy based on overall demand.

TAMPs cover all of the transportation assets, including many services which are not funded through LTP2. To ensure that the two plans are developed in harmony the 'key stages' of effective asset management have been used to analyse the issues and to inform the LTP2 action plans.

Progress

The development of LTP2 and the TAMPs are running in parallel but to different schedules. Although the process of producing LTP2 will help inform the Asset Management Plans, the scope of the public consultation will be different and the results may impact on later LTP2 proposals. These will be re-visited as required to better reflect the views of the public and the outcomes from the asset management process.

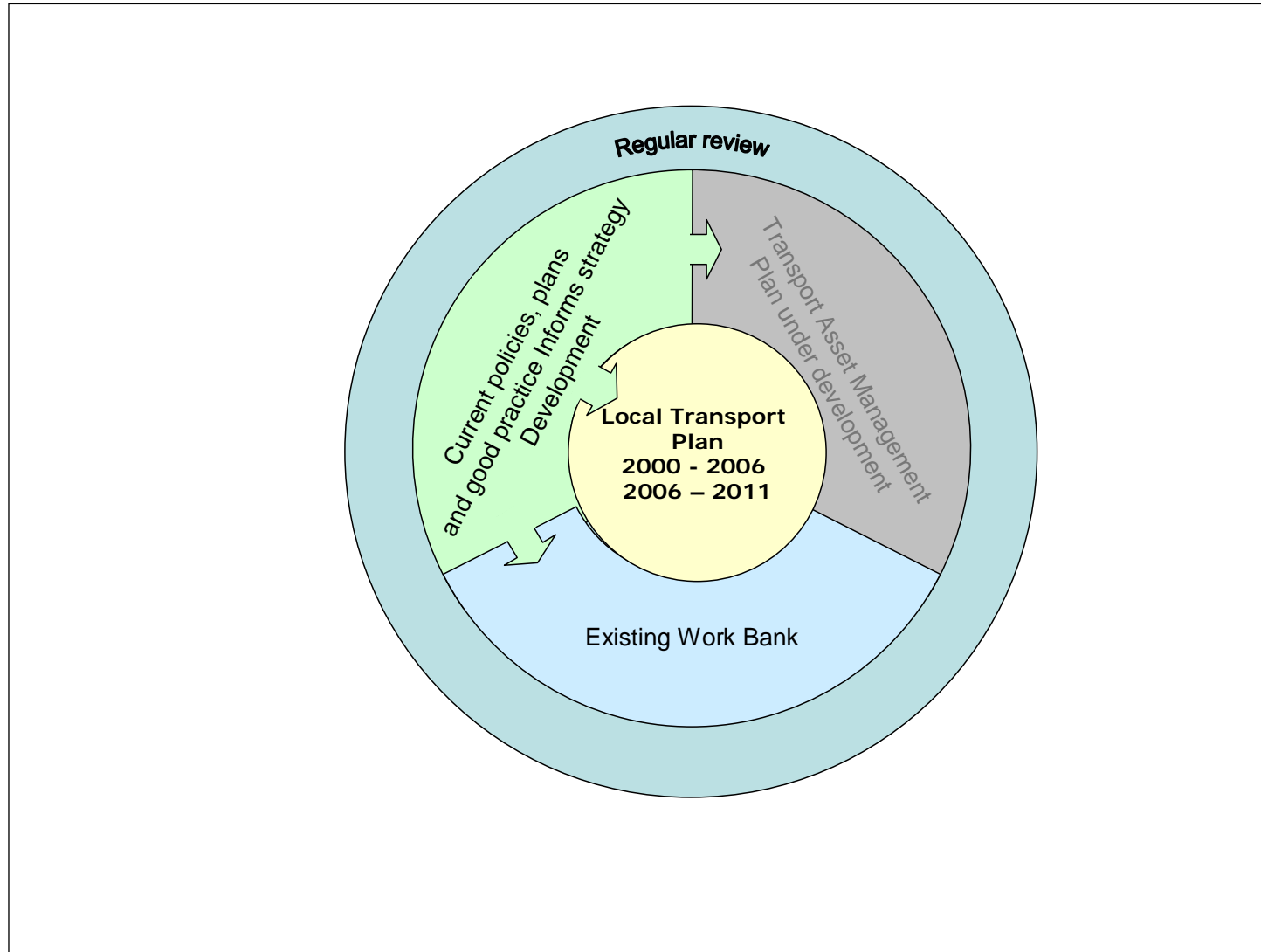
All the Partners operate a priority system to manage their works and implement repairs. Each are developing and implementing asset management plans based on their own district authority practice. During the life of LTP2 the authorities will develop a

uniformity of approach across all of their disciplines.

The district authorities are at different stages in developing their asset information and plans. There are many similarities in the systems in place though none are identical.

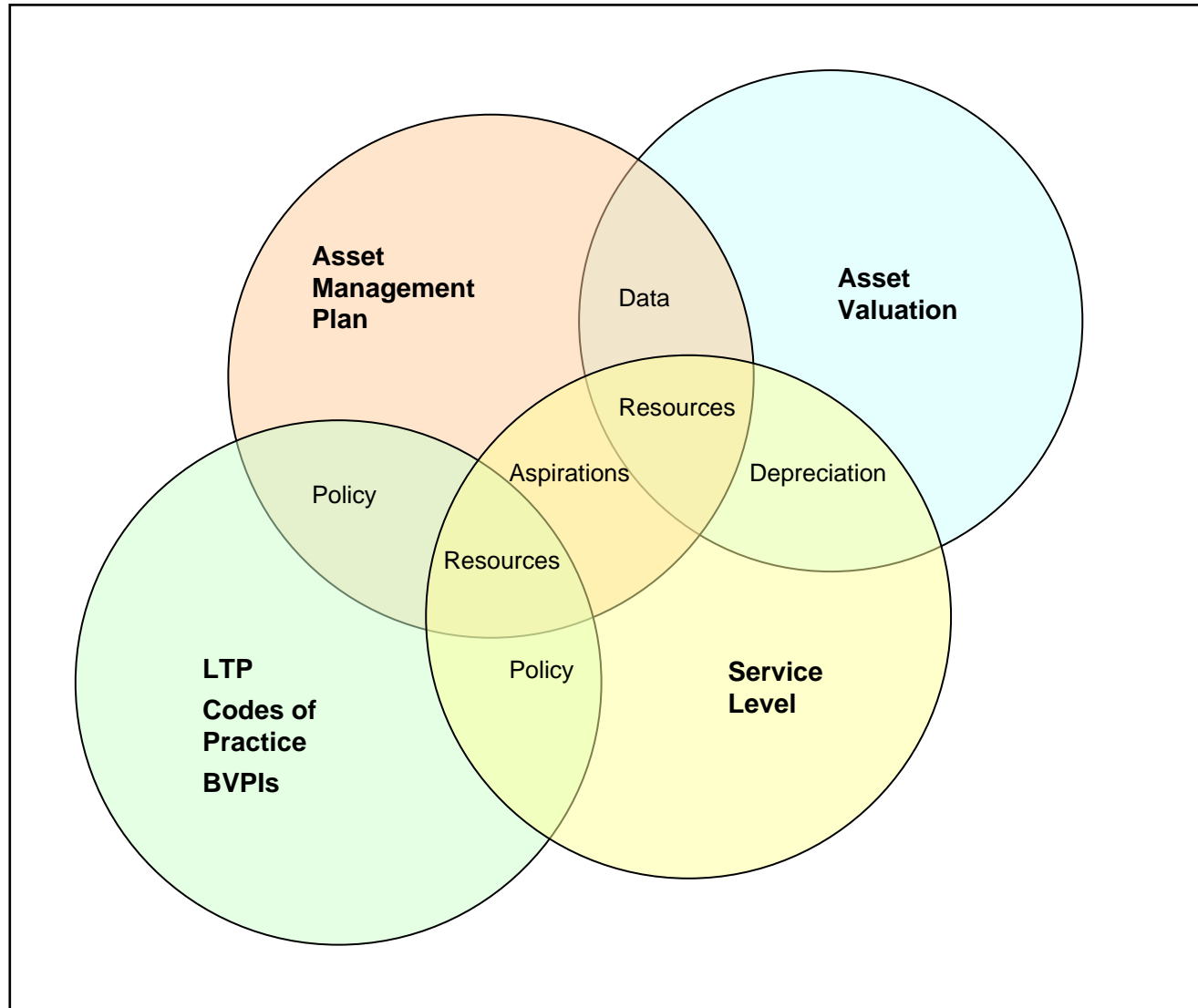
Appendix I includes reports on the progress being made by each authority in developing their Asset Management processes.

Figure 2.22: Relationship of current practice to the LTP and TAMP



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Figure 2.23: The key asset management process relationships



WHAT WE ARE GOING TO DO IN LTP2

Our strategy is continually developing and has been influenced by the results of the gap analysis undertaken as part of the asset management process. This analysis can be seen in Appendix I.

The asset management strategy has 9 key elements for infrastructure maintenance.

These strategy elements are:

- M1 Maintenance of roads and footways;
- M2 Strengthening and maintenance of bridges, walls and other highway structures;
- M3 Maintenance and operation of UTMC and CCTV systems (on street and public transport);
- M4 Maintenance of lighting, signs and road markings;
- M5 Maintenance of bus stations, shelters and stops;
- M6 Maintenance of car and lorry parks;
- M7 Maintenance of Rights of Way;
- M8 Winter maintenance; and
- M9 Reducing accident claims and better use of resources and materials.

General approach

All the Partners implement policies for asset management. These are designed to generate best value from available funding, maintain the condition of the assets and provide assets which meet the needs of the users.

The asset management planning process is being used to analyse work that is ongoing, created by ongoing inspection and 'what if' scenario planning. This process enables the development of strategies to address and manage the backlog of repairs and develop lifecycle planning for maintenance and use of all the assets.

Maintenance strategies balance the need for preventative maintenance, significant works and routine / reactive works.

The production of the *Framework for Highways Asset Management* and the new duties and responsibilities under the Traffic Management Act 2004 has encouraged an improvement in the rate of response to users' demands and to develop a more holistic approach to asset management.

All authorities have defined their network hierarchy in accordance with the relevant code of practice and the condition of the roads and footways is measured against national criteria. This ensures that priorities are determined in a consistent manner across authorities and works are then progressed in accordance with available

budgets. Where a scheme is proposed adjacent to a boundary (both within and outside of West Yorkshire) full liaison and co-ordination takes place and where appropriate a joint cross boundary scheme is developed.

As TAMPs are developed, forward planning becomes longer term and offers the opportunity to better co-ordinate maintenance proposals with asset use and improvement. There are extensive examples where this has already happened with schemes being delayed or bought forward to enable works to be combined and thus minimise disruption to highway users.

The timing of works is also planned to avoid congestion, especially on key routes where off peak, night time, school holiday working etc. are all used as applicable to the circumstances.

The integrated transport proposals identified in earlier sections of Part 2 e.g. traffic management and UTMC are all intended to make best use of the existing highway network.

LTP Maintenance capital allocations generally fund larger works with other funding, particularly revenue, supporting the overall approach. Increasing prices, health and safety requirements and lack of industry capacity are generating an increase in costs above inflation. The cost of some maintenance operations are also

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relatively high, for example the complexity of maintaining speed reduction features such as road humps and chicanes and the high quality paving used in conservation and pedestrianised areas.

Authorities are concerned that indicative budgets from the LTP and Formula Spending Share will not address the backlog of maintenance work and achieve user aspirations for improved roads and footways. Hence budgets have been augmented locally by whatever means available to each authority. District authorities are taking innovative approaches to funding, for example through prudential borrowing and Local Public Service Agreement (LPSA) packages and capital receipts. Commuted sums from developers are also used.

Targets reflect this level of commitment and are based on detailed calculations of the works cost per km on different road types and discounted by average rates of network deterioration.

M1 Maintenance of roads and footways

A high proportion of streets still need major works to bring them to a satisfactory standard.

Kerbs and footways are persistently damaged on narrow streets that were not initially designed for today's higher levels of car ownership and consequently suffer from over-riding and parking. Many local roads were not built to cope with the

damaging effect of bus services and delivery vehicles.

Cyclists and motorcyclists are particularly susceptible to poor and badly cleansed road surfaces (particularly the nearside 2 metres). Poor maintenance of footways, litter, dog fouling, puddles, etc. can discourage walking.

Any excavation in the existing highway generates a weakness, even when reinstated to the proper specification. The volume of utility works is massive. Around 64,000 holes are dug in West Yorkshire each year. These result in a poor ride quality, water ingress, an increase in the volume of trips and depressions, and are detrimental to the street scene.

The weather can have a major effect. Rainfall is straining a highway drainage system that was not designed for the current levels of development and is increasing the risk of flooding and subsidence. The rainfall is attacking weaknesses in the highway surface. If combined with cold winters, there could be a serious impact on road condition.

The highway maintenance strategy is focused on improving the overall street scene to create better neighbourhoods and more confident communities.

The most cost effective approach to maintenance is to intervene with timely, low cost works just as a street is beginning to deteriorate. However, it is also

necessary to address the backlog of streets which need significant work. While these streets remain in a critical condition it is essential that all defects which are a source of danger are identified and repaired quickly; which requires a significant commitment of resources.

As the backlog is addressed, the need for reactive work will reduce and this will release funds for preventative maintenance resulting in better carriageway and footway condition.

Many of the larger scale projects are funded from the LTP maintenance capital allocation and include:

- reconstruction and resurfacing of carriageways;
- carriageway surface dressing and similar treatments;
- reconstruction and resurfacing of footways and kerbing; and
- survey programmes.

However there is even larger revenue expenditure on:

- additional carriageway and footway reconstruction and resurfacing;
- reactive carriageway and footway patching and potholing safety repairs;
- localised patching and replacement of carriageways footways and kerbing;

- programmes of preventative maintenance schemes;
- gully emptying;
- improvements in drainage capacity;
- street cleansing, graffiti and needle removal etc;
- soft landscaping, including weed killing;
- safety fencing and guard rail;
- inspection programmes; and
- management of New Roads and Street Works Act (NRSWA) and Highways Act functions.

M2 Strengthening and maintenance of bridges, walls and other highway structures

The highway structure stock across West Yorkshire is varied in construction, type, age and purpose. Each variant requires a different regime of inspection, maintenance and repair works.

The Pennine areas consist of steep sided valleys with main roads generally only along one side. Most bridges are across the rivers and canals to industry/ housing on the other side of the valley. Bridges on these side roads also need to carry modern 40 tonne lorries, not just those on the main roads, otherwise access to industries is restricted.

In the Pennine areas there are also considerable lengths of retaining walls. Many are of dry stone construction and coming to the end of their useful life. Sudden failures are fairly common. These walls are as necessary as bridges for supporting the highway.

In the more lowland areas there are multi-span bridges across wide rivers and fewer small bridges. These bridges are significantly more expensive to maintain and strengthen than the smaller structures.

A significant number of highway bridges are not owned by the district authorities (e.g. many owned by Network Rail and British Waterways Board). The cost of strengthening these bridges to meet modern standards often falls partly on LTP funds.

Flooding, particularly flash flooding can cause significant damage to highway structures. The cost of repairing or replacing these structures reduces the ability to strengthen structures elsewhere. The frequency and severity of these floods is increasing.

In recent years most of the available capital funding for structures has been allocated to strengthening bridges to carry 40 tonne lorries. As a consequence there is now a backlog of work required to maintain bridges, walls and other structures.

Good inventory information is available for bridges and culverts but is poor for retaining walls.

LTP Maintenance Capital is used for:

- strengthening of substandard district authority owned structures;
- contributions to strengthening of privately owned substandard structures;
- major maintenance of highway structures; and
- principal inspections and assessments of highway structures.

The district authorities' revenue budgets fund:

- reactive and routine maintenance programmes; and
- inspections.

In addition there is some funding from private bridge owners, mainly for strengthening.

M3 Maintenance and operation of UTMC and CCTV systems (on street and public transport)

Traffic signal failure can result in accidents and injury to pedestrians and vehicle occupants and can also lead to considerable congestion. An effective maintenance regime is essential

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Over the last ten years a considerable number of signal installations have been replaced and upgraded to provide for the needs of vulnerable road users. This process needs to continue to ensure improvements in condition.

Advances in technology are starting to allow an interface with other data-lead Real Time Information systems e.g. bus location (RTPI). This will provide a hub of information for decision making about traffic management.

Obtaining feedback about traffic issues from the public is carried out, but further collection and analysis will assist with setting management strategies and plans.

Good inventory information is currently available about the state of the traffic signals and UTMC systems.

CCTV systems have proved useful for reducing crime levels and reducing fear of crime. Systems are provided both on-street and in bus and train stations

The systems are not just used for crime prevention, on-highway cameras are also used to monitor traffic levels and traffic signal operation. The UTMC operations regularly use the CCTV system to monitor traffic and make adjustments to signal timings to reflect changing traffic conditions.

Operation of the control rooms is required for most of the day and evening. Camera

and control room equipment needs regular maintenance if the effectiveness of the systems is to be achieved.

The LTP Integrated Transport capital allocations fund:

- upgrading of signal installations;
- upgrading of control systems; and
- replacement cameras.

The Partnership's revenue budgets fund:

- routine maintenance, e.g. cleaning and aligning signal heads and cameras;
- control room operations;
- data transmission;
- lamp replacement;
- repairs to failed controllers; and
- electricity.

M4 Maintenance of lighting, signs and road markings

Good quality lighting is essential for road safety and contributes to lower levels of crime. Pedestrians, cyclists and motorcyclists are particularly susceptible to injury in areas of inadequate lighting.

Ageing lighting columns are a key priority for renewal or refurbishment. The risk injury arising from column failure is a serious concern.

The inventory data is generally good for street lights and illuminated traffic signs, particularly under Private Finance Initiative (PFI) street lighting contract arrangements. It varies in quality for the non-lit signs, with a lack of easily accessible information in all but one district authority. Further improvements will enable a more comprehensive service provision.

Sign repair response times are prioritised but only informal processes are in place for life-cycle planning and replacements. These are areas identified for improvement and will be developed alongside indicators to measure the performance of sign maintenance within the life of LTP2.

The street lighting PFIs in Wakefield and Leeds will generate major improvements. Elsewhere, ageing columns remains a key priority. The risk of column failure is being managed from existing budgets, but the opportunities to make improvements which will significantly contribute to road safety, perceptions of personal and property security are still not available.

Apart from Wakefield and Leeds, some replacement lighting columns and illuminated signs are provided from the LTP Maintenance allocation, usually as part of other schemes.

New and replacement signs and lining are provided as part of accessibility, congestion and safety schemes from the Integrated Transport allocations (holistic

approach). Upgrades to signing along strategic routes have been carried out within West Yorkshire.

The district authorities' revenue budgets fund:

- routine maintenance e.g. lamp replacement, electrical and structural testing;
- fault repair;
- work to extend use of life expired columns;
- replacement of dangerous 'end of life' columns and signs;
- repair of vandalism and accident damage;
- replacement of road markings and studs;
- cutting back vegetation ;
- improvements to energy efficiency; and
- electricity.

M5 Maintenance of bus stations, shelters and stops

Bus stations, shelters and stops represent the customers' gateway to public transport and as such need to offer an attractive and convenient facility for users if public transport use is to be encouraged.

Metro has adopted a programme of asset replacement to bring modern standards to bus stops and shelters, concentrating initially on the core high frequency network. New shelters incorporate seating, lighting and passenger information.

Metro has transformed its bus stations in recent years, adopting where possible drive-in reverse-out operation. This significantly enhances the passenger experience and virtually eliminates vehicle/pedestrian conflict. A planned programme of maintenance, good security and a rigorous cleaning regime provides a clean, secure and friendly environment to encourage use of public transport.

The LTP2 Integrated Transport capital allocation will be used to fund:

- bus station refurbishment; and
- replacement shelter programme.

Metro's revenue budget funds:

- routine maintenance;
- programmed maintenance e.g. cleaning, painting;
- damage repairs;
- cleaning;
- security;
- electricity;
- water;

- sewerage; and
- waste disposal

M6 Maintenance of car and lorry parks

The destination of many car trips are the district authority owned car parks. Effective maintenance of the car parks is required both for safety and to provide an attractive introduction to the towns and cities.

The maintenance of cash machines and the collection of cash are essential for running the car parks (most car park operations are self financing) and also for traffic demand management.

There are some lorry parks across the county but there is pressure to identify sites for and provide further facilities.

The car park operations are mainly self financing. The ticket and fine income funds:

- reactive repairs to structures and surfacing;
- programmed maintenance e.g. cleaning, lamp replacement, lining;
- ticket machines repair and replacement;
- cash collection and processing of excess charges; and
- electricity.

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M7 Rights of Way (ROW) / bridleways and other paths

Many of the more urban ROWs can form useful links for walking between communities and to local services such as schools and shops. In the past most ROWs have been treated as leisure routes and do not have all-weather surfacing, appropriate direction signing or lighting.

There are insufficient networks of bridleways. This forces horse riders to use often busy roads with consequent risk of injury to rider, horse and other road users.

Cycle tracks, shared use paths (including structures) and bridleways are rarely subject to the same maintenance and cleansing regimes as the public highway.

The LTP2 Integrated Transport capital allocation will be used to fund enhancements, mainly to urban paths as part of accessibility improvements.

The district authorities' revenue budget will be used to fund:

- footpath/bridleway/byway surface repairs;
- bridge repairs;
- stile/gate/access barrier repairs; and
- vegetation management.

Most repairs and improvements are left to local authorities with appropriate calls on budgets and other resources. Some stiles

and gates are partly maintained by the landowners but are subject to a 25% grant from the local highway authority.

Each Authority will be preparing a Rights of Way Improvement Plan (ROWIP). Progress is reported in Appendix H.

M8 Winter maintenance

This is a service rather than an asset that needs to be managed. However, it is essential to keep the well used roads and pavements clear of ice and snow to maintain safe driving, cycling and walking conditions and to allow businesses, schools, hospitals and other services to operate.

Resources have to be prioritised as not all the highway network can be treated. Priority is given to bus routes, main roads and routes in the vicinity of hospitals to enable emergency traffic and essential traffic to keep moving.

Prevention in terms of gritting before ice forms is the key to successful operation. Throughout the winter period use is made of local weather forecasts and ice monitoring stations to ensure that treatment is given only when and where it is needed.

All winter maintenance is funded from the district authorities' revenue budgets, including:

- precautionary gritting;

- snow clearance; and
- grit bins.

M9 Accident claims and better use of resources and materials

Around 4,700 claims are submitted each year for slipping and tripping accidents and damage to vehicle tyres in West Yorkshire. The potential liability is high and carries a risk of impacting on maintenance budgets.

To counter the risk of claims West Yorkshire district authorities have a claims benchmarking group to identify good practice. Data analysis is becoming increasingly sophisticated in the area of claims, informing the ability to present a defence against payment.

Good inspection regimes and prompt repair of defects combined with auditable records is part of this strategy. There is a commitment to improving accident data and using this to carry out appropriate and timely maintenance to prevent accidents from occurring. This applies not just to slipping and tripping but also to snow and flooding related accidents and risks relating to poor utility reinstatements.

The percentage of claims settled at nil cost is increasing with the 'savings' used to improve the quality of the network.

This strategy requires a resource intensive approach to identify dangerous defects. It is essential that the backlog of major work is addressed quickly to reduce the risk of

accidents occurring and to minimise the funding requirements for reactive repairs.

Better use of resources and materials is part of the overall asset management process. New materials and equipment frequently are being tried, and where successful used in most future work. Joint purchasing contracts are being used where appropriate. For example a joint contract for surface dressing has recently been used by three of the district authorities.

Greater use of recycled materials is being carried out by all the district authorities. This includes both the reuse of materials excavated as part of maintenance and road improvement schemes and also the use of other materials such as glass in road surfacing.

There are few physical works associated with these measures, most of the cost being staff time funded from the Partners' revenue budgets, for example:

- effective inspection regime;
- rapid response to reports of dangerous trips and potholes;
- effective management of data to support claims / defence;
- rigorous defence of all claims where no liability exists;
- payment of genuine claims; and

- salt barns or domes for more effective use of salt.

Other measures are changes in practice often with little additional cost, for example:

- greater use of recycled materials;
- greater use of thinner surfacings (including quiet road surfacing);
- use of joint purchasing contracts; and
- e-tendering.

CLIMATE CHANGE

One of the effects of climate change is the change and severity and patterns of the weather. Higher average temperatures, more severe winds, floods and droughts are expected. These will lead to greater damage to the transport infrastructure and disruption to users. The floods are made worse by increasing impermeable areas from new developments.

Alterations to infrastructure and current practices will be introduced to mitigate and adapt to the changing climate:

- improvements to the capacity of drainage and watercourse systems and drain cleaning to cope with higher rainfall;
- more resilient signal controllers to cater for increased temperatures;

- more substantial lighting columns and different tree species to resist stronger winds;
- deflective barriers or shelter belts to reduce wind impact on vehicles;
- alterations to horticulture maintenance to cater for longer growing seasons; and
- wet spots gritted on cold dry nights.

This will be a gradual process over a number of years as climate changes take effect. There will be increasing cost implications for most of these actions that will need to be budgeted for.

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HOW WE ARE GOING TO DELIVER

Maintenance and management of assets are undertaken by a mixture of in-house and term contractors and scheme specific contracts.

There is now more joint working between authorities both on sharing good practice and in arranging joint contracts. Officers across West Yorkshire are active members of a considerable number of sub-regional, regional and national working groups covering all aspects of asset management, highways and public transport operations.

There is co-ordination of work on cross boundary roads to avoid delays to traffic. Where appropriate, work is done by one authority on other authorities roads. This happens regularly in winter maintenance operations with appropriate turn round points being agreed.

Another example is Gain Lane in Bradford. The infilling of Woodhall Quarry, Calverley requires the improvement of Woodall Lane in Leeds and Gain Lane in Bradford. It is intended that Leeds will do all the highway works including the section in Bradford.

Closer working with the Utilities has been developed over the years (Kirklees Metropolitan Council is recognised as a Centre of Excellence for this). This is leading to better co-ordination of works and better quality reinstatement of excavations.

Improved liaison e.g. with Police and bus operators on timing and methods of operation of works ensures that disruption associated with road-works is kept to a minimum. This is likely to improve as the Traffic Management Act is implemented.

Maintenance work is often not undertaken in isolation of other works. It is now common in all the district authorities to combine maintenance and integrated transport schemes to give a holistic approach (see Part 3 Introduction for an example).