

Appendix E. Highway Surface Drainage Lifecycle Management Plan

5.4. Norfolk County Council Highway Surface Drainage Lifecycle Management Plan

5.4.1. These assets are designed to :-

- ❖ Prevent the accumulation of surface water on carriageways, footways and cycleways.
- ❖ Prevent pollution from highway drainage affecting watercourses.
- ❖ Reduce future maintenance liability by minimising water damage to the highway structure.

5.4.2. Physical Parameters

5.4.2.1. This asset comprises highway gullies, kerb offlets, associated pipework, soakaways, catchpits, grips and backdrains, and outfalls.

5.4.2.2. Grips and Backdrains

5.4.2.3. These data sets are held in the highway inventory module of the HMS database (Jan 09). The backdrain figures include all those within the database including those with ownership recorded as Highway Ditch, Back ditch or unknown.

District		Grips nos.	Grips lin.n	Backdrains nos.	Backdrains lin.n
1	North Norfolk	29595	49895	4870	162303
2	West Norfolk	52673	90152	9681	426302
3	Breckland	25897	47275	6985	276165
4	Norwich City	5	14	16	391
5	Broadland	18622	31617	4011	115119
6	Gt Yarmouth	3264	5691	1440	44895
7	South Norfolk	38172	61187	14620	527530
Total		168228	285831	41623	1552705

5.4.2.4. Gullies and Kerb Offlets

5.4.2.4.1. These datasets are held in the highway inventory module of the HMS database (Jan 09).

District		Gullies	Kerb Offlets
1	North Norfolk	14797	567
2	West Norfolk	25984	2722
3	Breckland	18961	1079
4	Norwich City	19286	23
5	Broadland	18895	859
6	Great Yarmouth	13507	285
7	South Norfolk	19791	2235
Total		131221	7770

5.4.2.5. **Drainage Kerbs and Linear grids**

5.4.2.5.1. This data set is held in the highway inventory module of the HMS database (Jan 09). It includes such features as 'beeny blocks', combined kerb/drainage features. The linear surface drainage on both roads and footways includes attributes Slit, metal grating and drainage inlet. Measures are in nearest lin.m.

	District	Kerbs	Linear grids
1	North Norfolk	843	1946
2	West Norfolk	3021	1340
3	Breckland	2363	769
4	Norwich City	2843	618
5	Broadland	612	991
6	Great Yarmouth	1421	2372
7	South Norfolk	6715	1021
Total	Total	17818	9057

5.4.2.6. **Filter Drains**

5.4.2.6.1. This data set is held in the highway inventory module of the HMS database (Jan 09). It includes stone filled ditches, French drains and fin drains.

	District	Filter Drains nos	Filter Drains lin.m
1	North Norfolk	38	2721
2	West Norfolk	152	16465
3	Breckland	12	633
4	Norwich City	7	104
5	Broadland	84	3989
6	Great Yarmouth	45	7180
7	South Norfolk	214	15979
Total		552	47071

5.4.2.7. **Piped systems**

5.4.2.7.1. Other than surface features such as gullies, kerb offlets and filter drains no other data sets are currently recorded in the highway inventory module of the HMS database regarding piped systems. This includes pipework, soakways, catchpits, interceptor tanks and boreholes.

5.4.2.7.2. Drainage records of all estates built since 1974 are held centrally and can be requested from highway Development Control.

5.4.2.7.3. The local office holds some 'as built' drawings from County Council schemes and investigation surveys.

5.4.2.8. **Outfalls**

5.4.2.8.1. Few records are kept on these, though some can be identified within 'as built' drawings held at the local area office. They can be to the following types:-

- ❖ Anglian Water
 - Surface Water Main Drainage Pipe System
 - Combined System
- ❖ Environment Agency Main River under their control
- ❖ Inland Drainage Board Non – main River or stream under their control
- ❖ District Council 'sewer ditches' (few in number - In Breckland from old rural district council)
- ❖ Private Ditch

5.4.2.9. **Culverts**

5.4.2.9.1. These are contained in the lifecycle plan for structures.

5.4.3. **Life Cycle Asset Options**

5.4.3.1. **Creation/Acquisition**

5.4.3.1.1. These fall into 2 broad areas:

- ❖ County Council schemes
- ❖ Private developers

5.4.3.1.2. County Council Schemes:

5.4.3.1.3. Where they have been placed within the highway normally as part of

- ❖ Maintenance schemes to alleviate flooding on a specific highway.
- ❖ Schemes to resolve flooding issues over a significant area.
- ❖ An improvement scheme for another primary purpose where the opportunity is taken to improve the surface water drainage.

5.4.3.1.4. Private Developers:

5.4.3.1.5. Highway drainage may need to be provided by developers as part of planning consent. The Highways Development Control Team approves these. A commuted sum is required for their future maintenance through a section 38 agreement. Drainage records of all estates built since 1974 are held centrally and can be requested from highway Development Control.

5.4.3.1.6. The Area offices maintain these via the highway maintenance fund in all cases.

5.4.3.2. **Renewal/Replacement**

5.4.3.2.1. Upon the realisation that the surface water drainage system is no longer satisfactory, its replacement should be considered based upon drainage investigation works, local knowledge and best design practice.

5.4.3.2.2. This may result in renewal of existing provision or significant enhancement.

5.4.3.3. **Upgrading**

5.4.3.3.1. Upgrading is normally considered in conjunction with the renewal and replacement process.

5.4.3.3.2. Upon significant maintenance and integrated transport schemes the opportunity should be taken to review the surface water drainage facilities and carry out necessary works.

5.4.3.4. **Disposal**

5.4.3.4.1. This is normally considered in association with renewal and replacement. Existing drainage provision is seldom removed and is either utilised as part of the new design or disconnected and left in – situ.

5.4.4. **Non Asset Options**

5.4.4.1. **Demand Management**

5.4.4.2. In order to clarify public accountability for action under the Land Drainage legislation, all Enforcement Authorities (Environment Agency, Inland Drainage Boards, Anglian Water Services, District Councils within Norfolk have agreed the following Statement of Common Policy Land Drainage in Norfolk:-

- ❖ In event of wide scale flooding all authorities will respond and co-operate in alleviating the danger to public and damage to buildings.
- ❖ In responding to other land drainage problems the following authorities will take a lead by initially investigating problems in the areas specified.
- ❖ Any Authority receiving a request, which is not for them, will take the message and themselves pass it on for the customers to the appropriate lead Authority.
- ❖ Each lead Authority will decide what action, if any, it will take in pursuing enforcement or remedial activities, and for informing other agencies which may be involved.
- ❖ All enforcement authorities will work together in finding solutions to more widespread problems

5.4.4.3. The demand for scale of highway drainage provision can be minimised at development stage by reducing surface water run-off entering the highway as part of planning, conditions.

5.4.4.4. **Amending Standards**

5.4.4.4.1. Ground conditions vary throughout the county and soakage tests can determine the scope and nature of the design for new works.

5.4.5. **Life Cycle Treatment Options**

Do Minimum	<p>The do minimum activities are the routine activities we carry out in order to ensure the safe passage of highway users.</p> <ul style="list-style-type: none"> • Cleansing activities • Drainage Investigation • Odd new provision grips, ditches, gullies and offlets
Medium Life	<p>Reinforcement of existing system with additional capacity</p> <ul style="list-style-type: none"> • Pipeline repair to return capacity • Partially pipeline upgrade • Additional gullies • Additional soakage capacity
Long Life	<p>Significant renewal or enhancement</p> <ul style="list-style-type: none"> • New area provision • Pipeline upgrade

5.4.6. **Drainage - Routine Maintenance Activities**

5.4.6.1. Routine maintenance is the regular ongoing day to day work that is necessary to keep assets operating, including instances where portions of assets fail and need immediate repair to make operational again.

5.4.6.2. The routine works undertaken on the 'drainage asset' have been sub-divided into activities, the standards of which have been displayed in tabular form and are followed by details on objectives and response arrangements.

5.4.6.3. Reactive activities are by their nature unplanned and occur in response to sudden changes, whilst the other activities are carried out in a planned manner.

Drainage Activities			
Activity Type	Activity	Service Standard	2005 Code of Practice
Preventative	Cleansing		
	Gully Emptying	Once per year from schedule. Increased for those identified as requiring a greater frequency of cleansing.	In low risk areas by default all gullies should be cleaned once a year and arrangements for non-functioning gullies to be recorded for more frequent or detailed attention. Increased frequency at known trouble spots to be built upon experience.
	Kerb Offlets	Jet once per year or as often as is necessary to ensure efficient working.	In low risk areas jetted by default annually. As often as is necessary to ensure efficient working.
	Culverts & Manholes	Depends on location, extent of tree cover, rainfall, kerbing and sweeping.	In lower risk areas inspect every 5 years by default & cleaned as necessary
	Soakaways and Catchpits	Use individual maintenance plan for system if available	
	Interceptors, holding tanks		Depends on design and location, will need particular consideration on site specific basis

	<i>Cleansing cont.</i>		
	Piped drainage	Clear when required	Clear when required, but by default not more than 10 year intervals.
	Grips and Backdrains	<p>Clear vegetation from grips and backdrains and dig out when required.</p> <p>Supplemented by a pro-active schedule of cleaning of grips on an annual basis.</p> <p>It should commence after the last grass cut and the programme completed if possible before the worst effects of winter, but certainly finished by the end of March</p>	<p><i>2001</i> Grips and highway authority ditches should be cleared of vegetation and dug out when required. Grip clearing should be commenced after the last grass cut and the programme completed if possible before the worst effects of winter.</p> <p>Note that most roadside ditches are the responsibility of adjoining landowners.</p>
	Private Ditches		Responsibility of adjoining landowners

Condition Monitoring	Drainage Systems	With safety inspections of carriageway, cycleway and footway, with attention to known problems or specific areas after heavy rainfall as opportunity allows.	A risk based approach. Where possible and in order to create efficiency, these inspections should be combined with safety inspections, particularly in the case of gullies and ironwork.
	Surface Boxes and Ironwork	System required for referral to utilities for defects in their covers.	
Reactive	Address problem upon identification	Clean/repair to restore serviceability	

5.4.7. **Drainage Systems - Objectives and Response**

5.4.7.1. **Response**

5.4.7.2. This varies dependant upon the extent of depth of the hazard and its location. Responses to are detailed in the Highway Defect Risk Register App D (viii).

5.4.7.3. **Safety**

5.4.7.3.1. The objective is to;-

- ❖ Prevent the accumulation of surface water on carriageways, footways and cycleways.
- ❖ Ensure our systems are in a safe condition

5.4.7.3.2. The failure to remove surface water from the road can lead to ponding or more substantial localised flooding causing a safety hazard to highway users, particularly on high speed roads.

5.4.7.3.3. Displaced covers and frames can lead to potential trip hazards for pedestrians and a hazard to other users.

5.4.7.3.4. Damaged covers or leaking pipes and chambers may cause subsidence leaving a void in the highway.

5.4.7.4. **Serviceability**

- 5.4.7.4.1. The objective is to;-
- ❖ Prevent the accumulation of surface water on carriageways, footways and cycleways.
 - ❖ Ensure our systems are working
- 5.4.7.4.2. Ponding or flooding can cause roads to be blocked causing traffic disruption whilst adjoining property may suffer associated water damage.
- 5.4.7.4.3. Gullies are emptied to remove detritus. This ensures the continued efficient functioning of the gully and its connection. The frequency of emptying depends partly upon location; the presence of dirty industries; the degree of tree cover, level of rainfall, frequency of sweeping.
- 5.4.7.4.4. All gullies should be cleansed once per year and arrangements made for non-functioning gullies to be recorded for more frequent attention. Schedules of gullies requiring increased frequency of emptying should be built up by experience and any known trouble spots included.
- 5.4.7.4.5. The frequency of cleansing of oil interceptors will depend on their design and location and will need particular consideration on a site-specific basis.
- 5.4.7.4.6. Where, despite effective maintenance operations, flooding of the highway occurs, with implications for safety or serviceability, relevant warning signs should be placed in position as quickly as possible and users advised through local media. The cause of the flooding should be determined and given prompt attention, in order to restore the highway to a reasonable condition. If it is subsequently determined that the flooding is attributable to deficiencies in infrastructure or the maintenance regime, given the nature of the weather conditions under which it occurred, then action to permanently relieve the problem should be considered urgently. If the event is attributable to the actions of a third party, the matter should be taken up with them at the earliest opportunity.
- 5.4.7.4.7. All aspects of water draining on to and off of the highway, involvement and responsibilities of other bodies and how to progress such issues is fully described in our IMS '*Guidance SP03-04-G03*'.

- 5.4.7.4.8. Ironware comprising covers gratings, frames and boxes set in carriageways, footways and cycleways have the potential to compromise safety and serviceability and in certain cases cause noise and disturbance to local residents. Although responsibility for defective ironwork where this is part of the apparatus installed by a Utility may lie with that Utility, claims are often also pursued against the authority. Defects identified during inspection or from users should therefore be formally notified to the Utility using IMS *Procedure SP03-01-G08*.
- 5.4.7.4.9. Manhole covers and boxes in the carriageway should be installed to a tolerance of +/-5mm to the surrounding level. Gully frames and gratings should be installed level or not exceeding 10mm lower than the surrounding carriageway. When boxes, frames and covers are found to be greater than 20mm lower than the surrounding carriageway they should be re-set.
- 5.4.7.5. **Sustainability**
- 5.4.7.5.1. The objective is to;-
- ❖ Prevent pollution from highway drainage affecting watercourses.
 - ❖ Authorities have a duty to prevent nuisance to adjoining landowners by flooding and should work with others in the wider community to minimise future risk of flooding
 - ❖ Reduce future maintenance liability by minimising water damage to the highway structure.
- 5.4.7.5.2. Inadequate drainage provision and maintenance can cause pollution of due to nearby watercourses if highway run-off becomes contaminated.
- 5.4.7.5.3. Material arising from all road drainage emptying and cleansing operations has potential implications for pollution and should be disposed of correctly in accordance with Environment Agency, or equivalent authority, requirements.
- 5.4.7.5.4. In order to clarify public accountability for action under the Land Drainage legislation, all Enforcement Authorities (Environment Agency, Inland Drainage Boards, Anglian Water Services, District Councils within Norfolk have agreed a Statement of Common Policy Land Drainage in Norfolk. See 5.4.3.1.1.
- 5.4.7.5.5. Failure to remove surface water from the highway can allow the foundations of roads and footways to become penetrated by water which can contribute to structural failure, also embankments and cutting can become unstable. It can also reduce the effective life of highway assets causing an increased frequency of works.
- 5.4.7.5.6. For further advice on drainage environmental issues, refer to the *'Highway Corridor* document and policy database.

5.4.8. **Life Cycle Plan**

- 5.4.8.1. Upon re-surfacing damaged ironwork is lifted and refurbished. Known drainage issues should also be addressed prior to or as part of surfacing schemes. The cost is borne by the surfacing schemes.
- 5.4.8.2. We have analysed our ordering and inventory systems during 2007 to aid future lifecycle analysis for routine maintenance. We have linked inventory items to our routine maintenance rates for cleansing or renewal.
- 5.4.8.3. Assumptions have been made on;-
- ❖ Inventory/SOR linkage
 - ❖ Spend on reactive service lead requests being broadly similar
 - ❖ Traffic Management

5.4.9. **Life cycle Cost Analysis**

5.4.9.1. **Routine**

- 5.4.9.1.1. Currently we only have a limited number of inventory items complete in extent and with enough reliability to give a high or medium confidence. These are Grips, backdrains/ditches, kerb offlets and gullies.
- 5.4.9.1.2. Our records of our underground systems such as soakaways, catchpits and pipes are limited or incomplete. As a result we are still largely using historical data to justify routine our routine budgets.
- 5.4.9.1.3. This is accentuated by a large number of reactive works to restore serviceability ordered on a daywork basis.
- 5.4.9.1.4. We currently utilise the following strategy to maintain these assets.
- 5.4.9.1.5. Gullies, grips and kerb offlets - Annual cleaning as necessary and using proactive order based upon inventory
- 5.4.9.1.6. Backdrains, soakaways, boreholes, interceptors, filter drains, covers etc - Cleaned / replaced as necessary due to individual wear and tear
- 5.4.9.1.7. We do not hold condition data on the individual elements of the asset. They are inspected upon safety inspections and those requiring treatment prioritised for replacement depending upon the severity of the defect of the location.

5.4.9.2. Routine Works Budget

5.4.9.2.1.	2005/6	Actual Spend	
		County	City
	Gully Emptying	£1,191,000	£91,000
	Drainage Cleansing	£313,000	-
	Drainage Repairs	£1,901,000	£66,000
	Emergency Cleaning	£453,000	£36,000
	Total	£3,858,000	£193,000
	Grand Total	£4,051,000	

5.4.9.2.2.	2006/7	Actual Spend	
		County	City
	Gully Emptying	£923,000	£90,000
	Drainage Cleansing	£264,000	-
	Drainage Repairs	£1,839,000	£71,000
	Emergency Cleaning	£567,000	£28,000
	Total	£3,593,000	£189,000
	Grand Total	£3,782,000	

5.4.9.2.3.	2007/8	Actual Spend	
		County	City
	Gully Emptying	£1,080,000	£97,000
	Drainage Cleansing	£528,000	-
	Drainage Repairs	£2,020,000	£110,000
	Emergency Cleaning	£532,000	£43,000
	Total	£4,160,000	£250,000
	Grand Total	£4,410,000	

5.4.9.3.	2008/9	Actual Spend	
		County	City
	Gully Emptying	£981,000	£98,000
	Drainage Cleansing	£563,000	}
	Drainage Repairs	£1,729,000	} £105,000
	Emergency Cleaning	£451,000	£39,000
	Total	£3,724,000	£242,000
	Grand Total	£3,966,000	

5.4.9.4.	2009/10	Original Budget	
		County	City
	Gully Emptying	£960,000	£97,000
	Drainage Cleansing	£587,000	}
	Drainage Repairs	£1,832,000	} £72,000
	Emergency Cleaning	£530,000	£28,000
	Total	£3,909,000	£197,000
	Grand Total	£4,106,000	

5.4.9.5. **Structural Maintenance**

- 5.4.9.5.1. Schemes are identified by the local area offices. They are categorised into 5 bands based on the urgency leading to a rolling 5 year programme.
- 5.4.9.5.2. We have an assessment system in place that ranks schemes within a band and also allows comparisons to be made.
- 5.4.9.5.3. Budgets are presently allocated against the schemes requiring more immediate attention in each of the Areas. The aim is to reduce the number of reported floods.
- 5.4.9.5.4. We are investing £3.085m in drainage maintenance schemes in 2009/10.

5.4.10. **Service Levels**

- 5.4.10.1. There are no statutory indicators identifying the condition of highway drainage systems.
- 5.4.10.2. Members have approved the cost of listed schemes as the service level. We are considering whether this is sufficient in the future.

5.4.11. **Risk**

5.4.11.1. **Financial**

- 5.4.11.2.
 - Risk – Insufficient Routine Budget / Overspend

Budget based upon inventory, lifecycle planning and actual spend over last 5 years.

Impact = 1 (overspend up to £100,000) x Likelihood (Unlikely) = 2 = Risk 2 low risk

5.4.11.3. **Operational**

- 5.4.11.4.
 - Risk - The ability to deliver the required standards and liability

Highway drainage will not be unduly affected by unusual seasonal conditions.

Impact = 5 (liability in 3rd party claim) x Likelihood (Rare) = 1 = Risk 5 low risk

5.4.12. **Backlog**

- 5.4.12.1. Any negative movement against the service level will be considered a backlog and this demonstrated by the difference in the cost of carrying out the treatments.
- 5.4.12.2. These are reported annually to members.