



018530 - SWITCH

Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

DELIVERABLE 2.2.3b: GUIDELINES FOR THE PREPARATION OF AN INSTITUTIONAL MAP FOR CITIES IDENTIFYING AREAS WHICH CURRENTLY LACK POWER AND/OR FUNDING WITH REGARD TO STORMWATER MANAGEMENT

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Prepared by JB Ellis, L Scholes, B Shutes and DM Revitt, Middlesex University

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List of Abbreviations

BCC	Birmingham City Council
BMP	Best management Practice
BWB	British Waterways Board
Defra	Department for Environment, Food and Rural Affairs
CAR	Controlled Activity Regulations
CDM	Construction Design and Management Regulations
CIRIA	Construction Industry Research and Information Association
CMP	Catchment Management Plan
COW	Critical Ordinary Water Course
DCLG	Department for Communities and Local Government
DPD	Development Plan Document
EA	Environment Agency for England and Wales
EIA	Environment Impact Assessment
EQO	Environmental Quality Objective
EU	European Union
GBR	General Binding Regulations
HA	Highways Agency
IDB	Independent Drainage Board
IM	Institutional Mapping
IPPC	Integrated Pollution Prevention and Control
IUD	Integrated Urban Drainage
IUSM	Integrated Urban Stormwater Management
LA	Local Authority
LDD	Local Development Document
LDF	Local Development Framework
LDP	Local Development Plan
LDS	Local Development Scheme
NR	Network Rail
O&M	Operation and Maintenance
Ofwat	Office of the Water Regulator
POM	Programme of Measures
PPG	Planning and Policy Guidance
PPS	Planning and Policy Statement
RBMP	River Basin Management Plan
RPB	Regional Planning Bodies
RSPB	Royal Society for the Protection of Birds
RSS	Regional Spatial Strategy
SA	Sustainability Appraisals
SEPA	Scottish Environmental Protection Agency
SFRA	Strategic Flood Risk Assessment
SCI	Statement of Community Involvement
SPD	Supplementary Planning Document
STW	Severn Trent Water
SUDS	Sustainable Urban Drainage Systems
TCP	Town and Country Planning
UWWT	Urban Wastewater Treatment
WatCO	Water Company
WFD	Water Framework Directive

Executive Summary

The following guidelines are intended to assist partners in the preparation of an institutional map for their selected city where there is currently an identified lack of power and/or funding with respect to stormwater management. The SWITCH Learning Alliance Briefing Note 15: Institutional mapping is summarised and recommended as a suitable introduction to the task. A protocol for Institutional Mapping (IM) developed in Task 6.1 follows as a guide and checklist to the questions which should be addressed when preparing an IM. An example of an IM for Integrated Urban Stormwater Management (IUSM) for the City of Birmingham, UK is presented and the relevance of each section to the points of the protocol is indicated as follows. The map commences at the city level and moves upwards through the layers (IM protocol point 2.1.5). It explains the underlying social norms and conditions in Birmingham (2.1.8), sets out in detail the legislative and regulatory environment (2.1.7) and names the players and their relative power (2.1.4). The range of stakeholders and ‘action spaces’ associated with BMPs/SUDS is discussed (2.1.3). The internal rules of organisations (2.1.10) and compliance with these rules is considered (2.1.9) and behavioural changes in the operation of the organisations and institutions are proposed (2.1.2).

An introduction to the city identifies opportunities to modernise public and private housing stock and to install source control techniques in a current major redevelopment programme for the city. A section on legislative and strategic structures notes that BMPs/SUDS are being increasingly included and considered. UK Government guidance recommends measures for ensuring sustainable urban drainage systems to control surface water runoff and city councils are required to develop and implement Local Development Frameworks. However, legislation relating to SUDS in England & Wales is designed and developed for other purposes and a wide range of stakeholders have ownership and maintenance responsibilities for SUDS institutional arrangements.

The sections on surface water management and the EU Water Framework Directive note that considerable lengths of receiving surface waters in the Greater Birmingham Region are designated as being “at risk” or “probably at risk”. Master-planning is needed for more integrated delivery of strategic plans. Consultation with representatives of stakeholder groups is required together with a collaborative stakeholder process at the design stage.

The section on drainage responsibilities and adoption by Birmingham reports on the conclusion of a central government funded Integrated Urban Drainage study of Birmingham and identifies that the current complex organisational arrangements lack clarity and lead to inefficient and piecemeal investment decisions. Barriers to stakeholder group communication and unclear boundaries of overlapping responsibilities require amendments to legislation, institutional and planning arrangements if Local Authorities are to be the responsible bodies for future surface water drainage management. The major impediments and barriers to Integrated Urban Stormwater Management (IUSM) are not technology dependent but rather institutional and social, neither of which have been well addressed to date.

1. Introduction

This task addresses the preparation of an institutional map for cities where there is an identified lack of power and/or funding with respect to stormwater management. Deliverable 2.2.3b contributes to the section of WP 2.2 dealing with ‘Evaluation of decision making processes in urban stormwater management’. It builds on Deliverable 2.2.3a which highlights problems and opportunities for diverse stakeholder involvement with respect to current stormwater management strategies. It also complements Task 6.1 which reports on ‘Institutional arrangements and mapping for the governance of sustainable urban water management technologies: Mapping protocol and case study of Birmingham, England.’

The guidelines presented in this report are intended to assist partners in the preparation of an institutional map for their selected city. The SWITCH Learning Alliance Briefing Note 15 on Institutional Mapping is recommended as a suitable introduction to the task and the Institutional Mapping (IM) protocol which was developed in Task 6.1 is used as a guide and checklist with reference to the questions which should be addressed when preparing an IM. An example of an IM for Integrated Urban Stormwater Management (IUSM) for the City of Birmingham, UK is then presented and the relevance of each section to the points of the protocol is indicated and key phrases in the text are shown in bold font.

2. An Institutional Mapping (IM) protocol for Integrated Urban Stormwater Management (IUSM) in SWITCH partner cities.

2.1. Identified Protocol Points

The following sub-headings and associated sections (adapted from Green et al., 2007) specify the information which is required for the preparation of an IM and identify the points which need to be addressed. Although the protocol is presented as a numerically arranged list of points, it is not essential to respond to them in the arranged order. For example, a full response to point 2.1.2 may only be made following completion of the mapping process and in Section 3.1 'Introduction to Birmingham' only points 2.1.5 and 2.1.8 are addressed. The final two points (2.1.12 referring to data collection and 2.1.13 referring to modes of information presentation) are included because of their general relevance.

2.1.1. Specification of who is/are the institutional map creator(s) and who is/are institutional map user(s), and what is/are the technologies concerned.

The SWITCH partner City Learning Alliances are both the creators and the initial users. The technologies considered in this report are those relevant to Integrated Urban Stormwater Management (IUSM).

2.1.2. Clear determination of the purpose for undertaking the institutional mapping, and the type of behavioural changes that are required.

Institutional mapping is purposive and not primarily descriptive. Having identified what changes are required and by whom for the successful adoption of a technology, the purpose of institutional mapping is to identify who has the power to influence the likelihood of the adoption of those behaviours.

2.1.3. Identification and specification of the primary and secondary 'action spaces' likely to be relevant to the purpose determined in point 2.1.2, and a preliminary identification of how they interact.

Relevant information concerning stormwater management can be accessed from previous SWITCH reports. For example, Task 2.2.1a presents a catalogue detailing the range of options for stormwater reuse which have been employed by the various cities.

The primary 'action space' is Integrated Urban Stormwater Management (IUSM), but secondary 'action spaces' should also be identified. In England the most relevant other interacting 'action spaces' are:

- sustainable communities' policy
- land use planning and
- public decision-making.

However, further actions which may be relevant include:

- housing planning
- regional economic planning and
- urban regeneration planning.

Preliminary identification of how these ‘action spaces’ currently interact should lead to curiosity about their potential for greater involvement in pursuit of the institutional changes and objectives being sought.

2.1.4. Who are the players? A preliminary familiarisation with the institutional landscape at different levels, scales or layers. A preliminary identification of these layers and their relative power.

This involves the preliminary identification of the degree of ‘sameness’ of national and regional (provincial) and local institutional arrangements or the degree of decentralisation and ‘non-sameness’ to be encountered both within a country and between countries, which should be taken into account in the mapping.

The report for Task 2.2.3a, which outlines the current decision-making processes within selected cities, provides a useful introduction when responding to this section.

2.1.5. Selection of sequencing or ordering in which institutional layer mapping is to be presented in the institutional map.

There is a choice between:

- a) beginning at international and then national levels and progressing ‘downwards’ to the local and operational level; and
- b) beginning at the operational or local level and progressing ‘upwards’ to the national and then international level.

In practice the map creator may elect to begin an analysis at several different levels simultaneously, or to proceed ‘upwards’ or ‘downwards’. An iterative process will enable adequate trace linkages between institutional layers to be established.

There may or may not be a high degree of centralisation of institutional arrangements, and the cities may have a degree of autonomy or independence from central government in regulation of and legislation relating to surface water. However, on balance it appears logical to commence – at least initially - at the city level and move upwards through the layers.

2.1.6. Deciding about whether or not the institutional mapping is likely to be different and therefore presented differently, for each sustainable urban water management technology being considered in the SWITCH project (see 2.1.5 above). Integrated Urban Stormwater Management is different from other sustainable urban water management technologies.

2.1.7. What are the ‘rules of the game?’ Setting out in detail the legislative and regulatory environment focusing upon statutory instruments (including primary and secondary legislation) including the international level; regulations, guidance, guidelines, codes, administrative procedures; financial arrangements (including incentives, disincentives, and sanctions); and administrative procedures. These should include laws, rules and arrangements for stakeholder involvement.

This is a central task in institutional mapping and one which will usually consume a significant proportion of the time allocated to the mapping. Statutory instruments and regulations should be identified and specified as should other aspects of the regulatory

environment, including responsibilities for policing and enforcing laws and regulations. It is necessary to distinguish as accurately as possible between mandatory and non-mandatory regulations stemming from the law or other instruments. Dates when laws, regulations and other arrangements became operational should be specified.

A key part of this process is identifying both a) functional and b) geographical boundaries. Functional boundaries relate to the responsibilities given to various agencies in law. Geographical boundaries relate to the geographical jurisdictions of laws, regulations and procedures. Institutional history may be important and should be explained where believed to be relevant.

2.1.8. The informal ‘rules of the game’. Explanation of underlying social norms and conditions should be made where considered to be relevant to an understanding of the legislative and regulatory environment; actors and participants, and processes of public decision making.

For example, the policies and plans followed by Regional Development Agencies in England can only be properly understood by knowing about the context of social disadvantage and inequity in the urban areas concerned. Processes of public decision-making are partly shaped by public attitudes towards involvement in such decision-making, and so on.

2.1.9. Compliance: how far do the formal rules operate in practice?

Whilst there are usually rules, they are often not effective in practice for a wide range of reasons. Some assessments have to be made of how effective are the rules and why they are or are not effective (see Section 3.5 of this report ‘Surface Water Drainage Responsibilities and Adoption’, where barriers to urban drainage stakeholder cooperation and coordination are discussed).

2.1.10. The internal rules of organisations as these refer to what they must, may and cannot do; as to the procedures they must adopt; and the objectives they are to pursue.

It is necessary to explain how processes of public decision-making operate and the roles of the various actors which participate. These processes may be evolving and changing and direction of change is pertinent.

The public decision-making environment is normally rich in policy statements and plans of various kinds e.g. of water management agencies; of land use planning bodies and so on. These require identification together with the jurisdictions involved and the time scales, start dates and planning cycles of each plan. Plan content is highly relevant (see Section 3.4 of this report ‘Birmingham City Council and Surface Water Management’, where the importance of master planning is considered).

2.1.11. Definitions are required to lend clarity and precision to the institutional analysis and mapping, and so a glossary of terms should be provided.

Formal definitions as adopted by the organizations involved and as embodied in the institutions are critical. Other definitions will need to be added for the purposes of

clarity of exposition. Here, the general rule should be to keep these definitions as loose as possible, to avoid unnecessarily precluding meanings.

2.1.12. Including relevant data and information in the institutional mapping.

The structure of an area's institutions is partly determined by the cultural and political history of that area, but also by the physical and other characteristics. So, for example, the arrangements for water supply in a temperate zone with ample groundwater are likely to be different from those in an arid zone dependent upon rivers for water supply. Judgement will need to be exercised about how much and which data and information to include. The following kinds of data and information are generally regarded as relevant in the case of sustainable urban stormwater management.

- Population size (of city, country);
- Local climate and rainfall data;
- Per capita and trends in water consumption;
- Agency or organisation ownership (e.g. whether private, state or publicly owned).

2.1.13. Methods of presentation and portrayal of institutional maps.

As can be gathered from the above, the process of institutional mapping is multi-faceted and potentially very complex. Presenting an institutional map is therefore a challenging exercise. This challenge can only properly be met by employing a range of methods of presentation of the results of the institutional analysis which leads to the map. These methods include the following kinds of material:

- Textual; tabulated; graphical (e.g. showing trends in water consumption); cartographical (e.g. showing geographical jurisdictions or boundaries);
- Diagrammatic (e.g. organisational diagrams showing functional boundaries);
- Appended (i.e. information referred to in the text but which is stored separately from the text);
- Referenced (i.e. material not contained in the text or appendices but to which the map user is referred); institutional maps could also draw upon and utilise the following material where it is considered to be useful;
- Photographic;
- Videographic;
- Audio.

2.2. Learning Alliance Briefing Note 15: Institutional Mapping

This draft briefing note can be accessed on the SWITCH website (da Silva et al., 2008) and is included in Appendix 1 to this report. It explains that 'Institutional Mapping (IM) is needed to give insight into institutional and governance structures for urban water management.' It states that 'mapping the existing (formal and informal) power and influence exercised by the relevant institutions, particularly that pertaining to a new technical innovation being considered, is regarded as a key element of the SWITCH approach to facilitating change in the involved cities'.

‘A local IM identifies which institutions have the power to deliver, fund or otherwise influence the successful up-take of technical measures in order to deliver sustainable urban water management.’ ‘Intra-organisational rules partition what an organisation can do into three categories: what it must do, what it may do and what it must not do. Institutional mapping focuses on actions.’

‘The powers and funding to deliver integrated water management may be scattered between different institutions. It is therefore necessary to map out the functional and geographical boundaries and know where the powers and funding to deliver the different courses of action reside in a specific city.’ ‘IM can provide the necessary insights for developing realistic plans.’

A reading of the complete briefing note is recommended before commencing IM process.

3. Institutional map for Birmingham

The following Institutional Map for the city Birmingham, UK focuses on Integrated Urban Stormwater Management (IUSM). It aims to address the objective quoted in Section 1 of the SWITCH Institutional Briefing Note 15 (draft), 'Institutional mapping (IM) is needed to give insight into institutional and governance structures for urban water management.' In order to provide guidance to the reader, the links between the components (text, figures and tables) of the map in Section 3 and the relevant phrases in the points listed in Section 2, IM Protocol, are indicated. Key points in the text of Section 3 are summarised at the end of each section and significant sentences in the text of the map are shown in bold font. The format is recommended for future IM city reports in order to guide and sustain the reader through an inevitable maze of legislation and involved stakeholders.

3.1. Introduction to Birmingham

Addressing IM Protocol 2.1.5 'Selection of sequencing or ordering in which institutional layer mapping is to be presented in the institutional map'.

In the following approach, the IM commences at the city level and moves upwards to the regional and national levels

Birmingham is a city and metropolitan borough in the West Midlands of England close to the geographical centre of England. It is the largest of England's core cities and is generally regarded as the United Kingdom's second city. The reputation of Birmingham was forged as a **powerhouse of the Industrial Revolution in Britain**, and this led to the city being known as 'the workshop of the world' and a 'city of a thousand trades' (Cherry 1994). **The City of Birmingham has a population of 1,001,200 (2005 estimate)** which had declined steadily in the 1980s because of a net outflow of residents to other parts of the United Kingdom, notably the West Midlands. From 2001 when the population had fallen to just under one million (985,000), the city's population has once again grown mainly because of an excess of births over deaths and because of international migration. Birmingham forms part of the larger West Midlands conurbation, which has a population of 2,284,093 (2001 census estimate), which includes other cities and towns including Solihull, Wolverhampton and the towns of the Black Country. From the mid-18th century onwards Birmingham grew into a major industrial centre with an economy based upon manufacturing and engineering mainly based in small workshops rather than in large factories or mills. **The city's manufacturing base has declined enormously in the second half of the 20th century and today the economy is based on the service sector (www.birminghameconomy.org.uk).**

The location of the Birmingham conurbation across the catchments of the Trent, England's largest river, and the Severn has influenced the organisational form of water management in England. The Severn-Trent Water Authority was created because dividing the conurbation between two different water authorities would create obvious problems. Hence, England's two most important catchments were treated as one. This solution was continued when the water industry was privatised with the creation of Severn-Trent Water as the wastewater company which also supplies water to some parts of the two catchments. Birmingham has an annual rainfall of between

700-750 mm. It claims to have more canals than Venice; a product of the industrial revolution. Those canals and the land around are now a central focus of economic regeneration activities. In the late nineteenth century and early 20th century it was one of the great centres of municipal power in the UK; being mayor of Birmingham was a route to becoming Prime Minister – such a transition from local politics into national politics no longer occurs. Possibly the greatest mayor, Joseph Chamberlain, organised the construction of the Elan Valley project, completed in 1904, to bring water to Birmingham by constructing a series of reservoirs in Wales and conveying the water 118 miles by tunnels, viaducts and pipes to Birmingham. That system is still a central component of water supply for Birmingham. Overall, South Staffordshire Water, one of the two water suppliers to the conurbation, obtains 40% of the water resource from the Sandstone aquifer and the remainder from impoundment reservoirs and directly from the river Severn. The position of the other water supplier, Severn-Trent, is similar (Green at al., 2007).

Within the spatial boundaries of Birmingham City Council, the city is organised into ten political constituencies (for the election of Members of Parliament to the House of Commons located in London) which have also been adopted as ‘partnership’ Districts. The political constituencies are further sub-divided into electoral Wards in which Councillors are elected to membership of Birmingham City Council. The Birmingham Association of Neighbourhood Forums (BANF) recognises 70 neighbourhoods at the level below Wards.

Key points

- *A population of approximately 1M;*
- *The city initially developed during the Industrial Revolution;*
- *The manufacturing base has declined enormously in the second half of the 20th century*
- *Current economy is based heavily on the service sector.*

3.2. Contexts, customs, attitudes and perceptions

IM Protocol 2.1.8. The informal ‘rules of the game’. Explanation of underlying social norms and conditions should be made where considered to be relevant to an understanding of the legislative and regulatory environment.

For example, the policies and plans followed by Regional Development Agencies in England can only be properly understood by knowing about the context of social disadvantage and inequity in the urban areas concerned.

There are a number of underlying social and economic characteristics of the City of Birmingham and its people that are relevant to the purpose of the SWITCH project. These characteristics are examples of the ‘Social norms and conditions’ described in Point 2.1.8 of the Protocol. Birmingham has a proud heritage of invention and innovation going back to the Industrial Revolution. This heritage is based not only upon engineering innovations which were crucial in the Industrial Revolution but also ways of organising crafts and manufacturing, and ways of transporting raw materials and finished goods. Today Birmingham remains an innovative city, although access and use of new technologies, such as the Internet, is currently below the national

average. Access to the Internet varies by ward in Birmingham from 33% to 59%, with a mean of 44% for the city (compared with a national mean of 63%) (Birmingham City Council, 2006).

An unusually large proportion of the city's housing stock is in the control of either the local council or housing associations (i.e. social landlords) compared with the national average. Birmingham City Council is therefore in a relatively powerful position to influence the nature of its housing stock and the facilities within them. A high proportion (57%) of the council's housing stock is assessed as in need of modernisation to meet the Decent Housing Standard. This means that the Council has an opportunity to modernise its housing stock over the next decade or so. About one-third of the private sector housing stock is also in need of modernisation and will presumably also be progressively modernised over the next decade or so. Over 15,000 new homes are estimated to be needed in Birmingham over the five year period, 2006-11. **The required modernisation and the need for new housing present important opportunities in the context of the SWITCH project with regard to retrofitting sustainable water use technologies (e.g. water saving devices in homes) and the introduction of source control methods such as rainwater harvesting.**

Birmingham is currently progressing through a major redevelopment of the city, which involves replacing much of the earlier redevelopment which took place in the 1950s and 1960s following the blitz during World War II. Birmingham City Council recognises that there has been a lack of neighbourhood redevelopment schemes and that the city's communities are experiencing disadvantage related to this. **Redevelopment presents opportunities to alter the ways in which water is used.** Unfortunately disadvantage and deprivation are important features of the Birmingham socioeconomic landscape. **10% of the most deprived electoral wards in the country are located in Birmingham** which has a very high proportion of Black and Ethnic Minority (BME) communities compared with other British cities. Although disadvantage and deprivation are not always associated with members of BME communities, often these communities experience higher levels of disadvantage and deprivation than others. Alongside this tends to go poor access to decision-making by such communities.

The MORI organisation conducts surveys of Birmingham City resident's perceptions and views for Birmingham City Council as part of the Council's approach towards its Community Strategy. Birmingham people are dissatisfied with their environment in a number of ways. In 2004, approximately 44% perceived their city to be 'green'; about 36% perceived it to be 'clean'; and about 33% perceived it to be safe. This suggests a hypothesis that there may be support for sustainability strategies amongst Birmingham people. **The development of a 'sustainable city' is one of the 10 key themes identified as underpinning the vision for the city of Birmingham.** A sustainable city is viewed as one 'where the ways we meet the needs of the present do not compromise our ability to meet the needs of the future (www.bhamsp.org.uk).

Policy in relation to governance in Birmingham (as well as nationally) is currently in a dynamic evolutionary state, and has a much greater emphasis than formerly upon the statutory community leadership role of the local authority (i.e. Birmingham City Council) and collective responsibility. A much greater emphasis on partnership working is central to this dynamic.

Key points:

- *Opportunities exist to modernise public and private housing stock (e.g. to fit water saving devices in homes and to install source control techniques);*
- *Ongoing current major redevelopment programme for the city;*
- *High levels of socio-economic disadvantage and deprivation have been identified*

3.3. City of Birmingham, UK: legislative and strategic structures

(Ellis et al., 2007)

IM Protocol 2.1.7 What are the ‘rules of the game?’ Setting out in detail the legislative and regulatory environment and focusing upon statutory instruments.

2.1.4. Who are the players? A preliminary familiarisation with the institutional landscape at different levels, scales or layers.

3.3.1. Legislation and Regulation of Urban Surface Runoff

In the UK, legislation governing the drainage of urban areas can be traced back over the past two centuries and has become established in complex statute and case law. This has given statutory and permissive powers to a variety of organisations, stakeholders, land owners and the public at large. It is also complicated by the regulatory process where responsive bodies may be public, private and regulated or private and unregulated. The principal stakeholders for urban drainage in England & Wales (Scotland has separate organisations and powers) are identified in Table 1 which also provides a summary of their flood management responsibilities (see also Chapter 3 “Planning SUDS” of the CIRIA, 2000, “*Sustainable Urban Drainage Systems: Design Manual for England & Wales*”).

Landowners have responsibility for drainage within the curtilage of their property boundary with riparian owners having additional responsibilities for the maintenance and effectiveness of drainage channels and watercourses along their property boundaries.

In addition to drainage responsibilities, **Local Authorities** are also responsible for planning and emergency services. Planning responsibilities cover various levels e.g. district, county and unitary. Regional Planning Bodies can also have an important role to play in the planning process. However, **as the principal planning authority, the local authority has the responsibility for the production and management of regional spatial strategies and local development plans.** This process is key to ensuring that the spatial aspects of integrated urban drainage are properly accounted for; such plans should fully address flood risk and urban stormwater management. **Local authorities are also often the highway authority with responsibility for local roads, public landscaping and local land drainage.**

Table 1 Major Stakeholders Responsible for Urban Drainage

(IM Protocol 2.1.4 Who are the players? A preliminary familiarisation with the institutional landscape at different levels, scales or layers. A preliminary identification of these layers and their relative power.

ORGANISATION	FUNCTION	RESPONSIBILITIES
Local Authorities (LAs)	Drainage, flood alleviation and regulation of watercourses (non-river), apart from designated main rivers or more recently Critical Ordinary Watercourses (COW's).	Powers under the Public Health Act 1961 and particular responsibilities in drainage districts (as set out in Land Drainage Act 1991). Major incident coverage and recovery
Highway Authorities (HAs)	Responsibility to keep urban roads (except trunk roads and motorways) free from flooding and to make satisfactory provision for highway runoff.	Highways Act 1990 and Land Drainage Acts 1991, 1994. Also responsibility for planning for, and managing recovery operations following major flood events under the Civil Contingencies Act 2004.
Internal Drainage Boards (IDBs)	Not for profit Supervisory duties over flood defence and drainage for low-lying land. More recently IDBs have been audited by Defra consultants and they are now being encouraged to amalgamate or join in Commissioner Groups to provide for administrative efficiencies and service improvements.	Land Drainage Acts 1976, 1991 and 1994, covering O&M, conservation and revenue-raising. Responsibility for drains, dykes and ordinary watercourses in low-lying land. Funding is through drainage levies via the Local Authority rates. Operate Land Drainage Bylaws through which they have a diverse range of powers over riparian and ordinary land owners.
Water Companies (Sewerage Undertakers) (WatCOs)	Responsibility for providing and maintaining a public sewerage system including sewers carrying surface water from impermeable building areas.	Water Industry Act 1991 and 1999 obliging companies to provide and maintain a drainage and sewerage system to ensure effective area drainage and to authorise and charge for discharge of trade effluent. Regulated by Ofwat
Environment Agency (EA)	Aims to protect and enhance the environment and make positive contributions towards sustainable development. Responsible for O&M and improvement of flood defences and 24 hour flood warning service with emergency response. Supervisory duty by consent over Local Authorities and IDBs. Reports to Defra on high level targets and sustainability indicators. The EA is primarily funded through government grants mostly through Defra and LA rates.	Powers and duties set out in Environment Act 1995 and related legislation. Regulation and executive action on water resources, land, water and air quality, flood and coastal defence, flood warning, waste management, navigation, conservation, fisheries and recreation. Responsibility for designated main rivers and COWs. (since March 2005) and production of Flood Plans and Warning systems.
Department for Environment, Food and Rural Affairs (Defra)	Sets central government policy (and transposed EU legislation) and provides strategic directions.	Formed by central government and reports directly to ministers. Has overall policy responsibility for flood risk and 2004 "Making Space for Water" strategy promoted a holistic approach to flood risk management. Is a fully Government Funded Body .

However, although more robust than the former PPG25 it should be noted that this is still, at present, only a guidance document carrying no mandatory or enforcement requirements although Local Planning Authorities must now consult the Environment Agency for England and Wales (EA) on all significant developments. **There are intentions to extend these planning arrangements for new developments to take into consideration the implications of climate change with water recycling and use of renewable resources.** The EA, in developing proposals for flood protection/management schemes, requires a sensitivity allowance of 20% on design flood levels to accommodate climate changes.

The existing SWITCH reports which are relevant to SUDS or Best Management Practices (BMPs) are:

- *Deliverable 2.1.2 A design manual incorporating best practice guidelines for stormwater management options and treatment under extreme conditions, Part A: Review of design guidelines for stormwater management in selected countries and Part B: The potential of BMPs to integrate with existing infrastructure (i.e. retro-fit/hybrid systems) and to contribute to other sectors of the water cycle and*
- *Deliverable 2.2.1a Catalogue of options for the reuse of stormwater.*

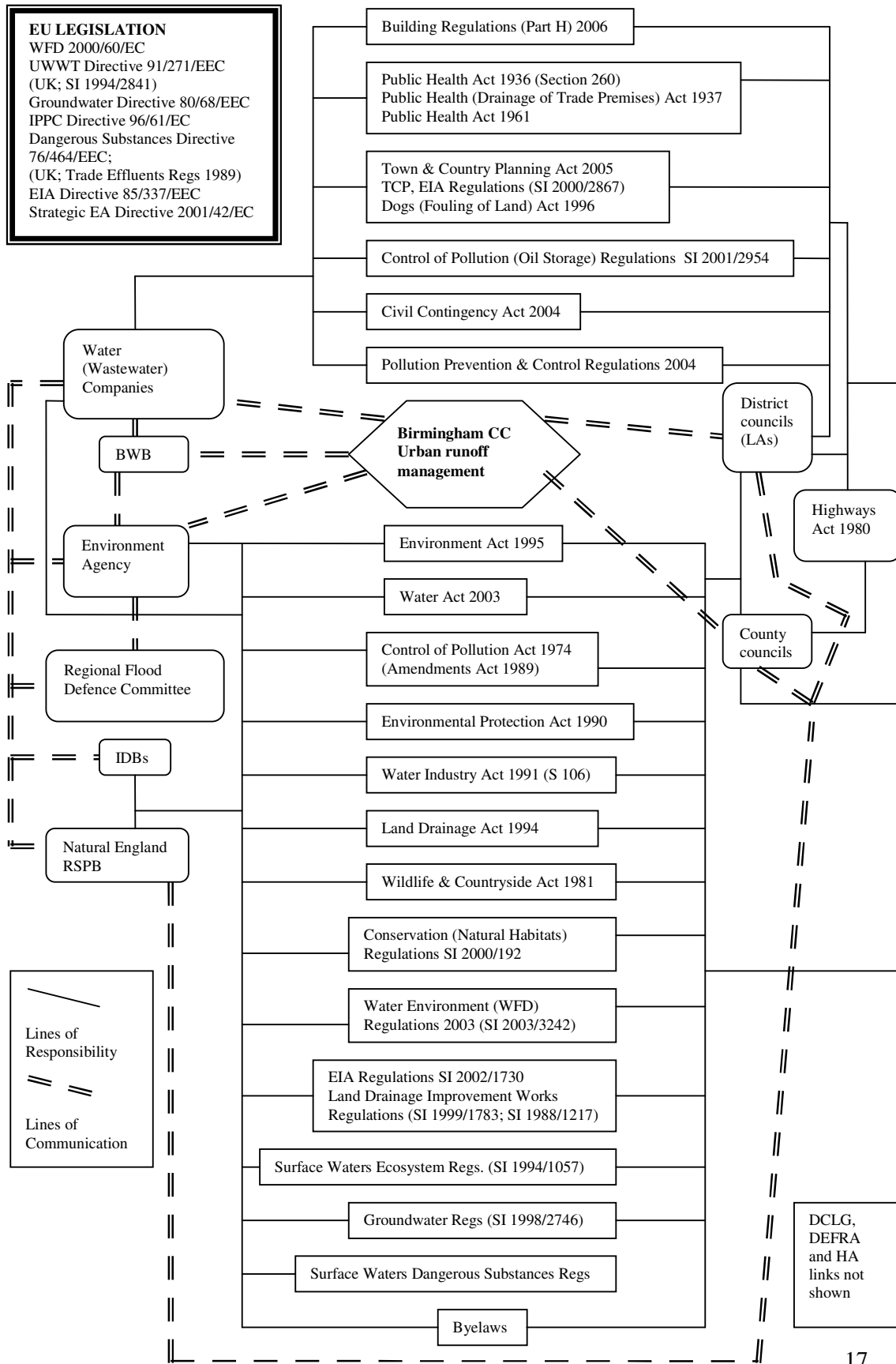
Whilst the ownership and maintenance of conventional piped drainage networks is defined in “*Sewers for Adoption 6th Edition 2006*” (1996, Water Services Association), **most BMPs systems can be considered to be either drainage or landscape elements and there is no clear guidance on responsibilities for their operation and maintenance (Pitt, 2008).** A particular legislative issue is that of the “right to connect” new building drainage to the public sewerage system as provided under Section 106 of the Water Industry Act which has been cited as a major inhibition to the provision of BMPs. **The UK Water Regulator, Ofwat is currently considering the possible re-definition of a “sewer” and “drain” under the Act so that open surface water systems such as swales, infiltration trenches, wetlands etc., may be considered to be a “sewerage asset” for potential adoption purposes by the water companies (sewerage undertakers).** A trial framework agreement on adoption, duties and responsibilities for BMP systems has been drawn up and implemented by the Scottish Environmental Protection Agency (SEPA) under the Water Environmental and Water Services (Scotland) Act 2003 for Scotland and a similar framework agreement is in consultation within England & Wales.

A generic outline framework for the regulatory management of urban drainage in relation to the position and responsibilities of a unitary or local authority such as Birmingham City Council is given in Figure 1. The specific responsibilities of Defra and the Highways Agency are not included in this diagram and the role of riparian and other landowners is also excluded. It is also the case that Water Companies and Internal Drainage Boards are currently not statutory consultees in the planning process. However, the powers of the EA have changed with the introduction of PPS25 which gives the Agency a statutory consultee role to all significant development proposals.

Key points

- *Table presented of major stakeholder (local and central government departments and agencies) and their responsibilities including legislation and regulation;*
- *Figure presented of the New Planning System in England & Wales as a framework for the regulatory management of urban drainage in Birmingham*
- *BMPs/SUDS are being increasingly included and considered;*
- *Existing identified SWITCH reports are relevant to the consideration of BMPs/SUDS:*

Figure 1 Generic Framework for Urban Surface Water Management (IM Protocol 2.1.7)



3.3.2 SUDS/BMPs

IM Protocol points 2.1.7 and 2.1.3 Identification and specification of the primary and secondary ‘action spaces’ likely to be relevant to IUSM (e.g. land use planning) and a preliminary identification of how they interact.

A key characteristic of the institutional arrangements that characterise the regulatory and legislative environment for SUDS in England is that they are reliant on legislation designed and developed for other purposes – most notably legislation relating to traditional ‘hard’ engineering and piped systems and that relating to planning. Unfortunately, this legislation does not make provision for the wider range of components associated with SUDS, leading to a lack of legislative clarity regarding both the ownership and responsibility for SUDS maintenance and a reduction in their uptake (Defra, 2005).

This is further compounded by the fact that the sewerage system is not owned by any one stakeholder - nor is it in common ownership. Instead, a wide range of stakeholders have ownership and maintenance responsibilities for both public and private drainage systems, leading to further institutional complexity, confusion and the non-adoption of a number of SUDS (Defra, 2005).

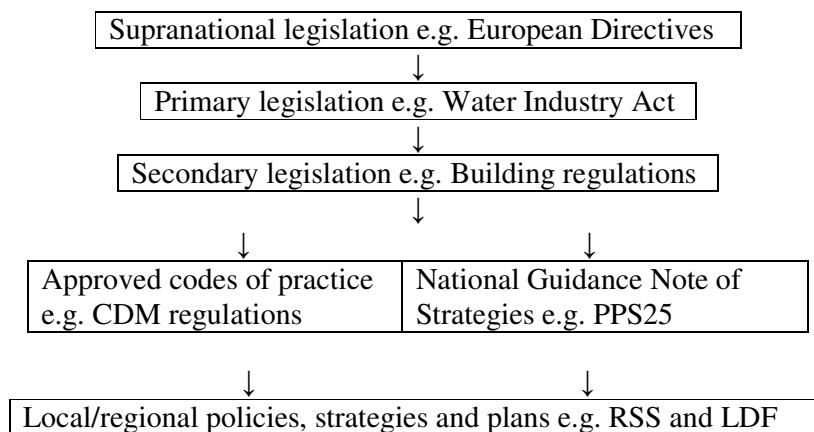
These stakeholders include a wide variety of public and private organisations, land owners, developers and the public each of which have different statutory and permissive powers deriving from a wide array of legislation and case law history. In addition, the regulatory environment differentially interprets primary and secondary legislation in its guidance notes and codes of practice at the national level and in its policies, plans and actions at the national, regional and local levels (**Figure 2**). The end result is an institutional landscape which, arguably, is in its present form ill-equipped to deliver a sustainable system of integrated urban drainage management.

It is, however, recognised that many of the problems associated with the implementation, operation and maintenance of SUDS in urban areas of England will require changes to legislation, guidance and decision tools if the current barriers to SUDS implementation are to be tackled and a more SUDS ‘friendly’ institutional framework is to be developed (Green et al., 2007).

3.3.2.1. *Linked ‘action spaces’*

Because SUDS do not have a legislated ‘action space’ as could be described for traditional end-of-pipe technologies, the **institutional arrangements that form the structure of powers, duties and actions with respect to SUDS are ‘taken’ from a range of linked ‘action spaces’**. This is recognised in the institutional mapping of SUDS in England which draws on the ‘action spaces’ associated with:

- The Government’s sustainable communities programme which provides an opportunity to retrofit urban areas using SUDS;
- The water resource and planning ‘action space’ which provides the legislation for determining the rights and responsibilities of various stakeholders in the application, maintenance and adoption of SUDS as ‘sewers’.



CDM Construction Design and Management Regulations

Figure 2 Hierarchy of SUDS regulation in England and Wales (adapted from: National SUDS Working Group, 2004:5)

- The land use planning ‘action space’ which provides a pivotal role in ensuring that SUDS are incorporated into new developments and provides the strategic context for the incorporation of SUDS into Regional Spatial Strategies (RSS) and Local Development Plans (LDPs).
- In the development control ‘action space’ which, as evident in PPS25, not only embraces SUDS as important flood risk management technologies for Local Authorities to promote in relation to building regulations and new developments but also requires Local Authorities to prioritise their use in determining planning applications (DCLG, 2006).

3.3.2.2. *Legislation and regulatory environment*

The range of stakeholders and ‘action spaces’ associated with SUDS highlights a number of legal issues and regulation irregularities which can cause confusion for those trying to implement SUDS. And, as there is no legislation available to enforce the delivery of SUDS, this inevitably leads to their reduced inclusion in the management of water in urban areas (Pitt, 2008).

Key Points

- *Legislation relating to SUDS in England & Wales is designed and developed for other purposes*
- *A wide range of stakeholders have ownership and maintenance responsibilities for SUDS institutional arrangements which with respect to SUDS are ‘taken’ from a range of linked ‘action spaces’*

3.4. Birmingham City Council and Surface Water Management

IM Protocol 2.1.7

As part of its responsibility for surface water and land drainage, Birmingham city council provides a policy statement on its strategic approach to, and statutory responsibilities for, flood defence (www.birmingham.gov.uk). This public statement is part of the city council responsibility for assessing flood risk within its area and plans for reducing and managing such risks as required under government targets. A stated objective within the policy statement is “*to encourage the provision of adequate, economically, technically and environmentally sound and sustainable flood defence measures*”. In addition, to “*social and/or economic benefits*”, this objective will also “*take account of natural processes*” in “*accordance with best practice*”. This document is likely to be re-visited shortly in the light of recent changes in Planning Legislation, the introduction of PPS25 and the widened responsibility of the EA in respect of Critical Ordinary Water Courses within the City.

However, all flood defence work is undertaken under permissive powers which means that Birmingham City Council is not obliged to carry out such works on their 95 km of critical ordinary watercourses (COWs) or 45 km of “non-river” or less distinct ditch courses for which they have operating authority. As noted in Table 1, the responsibility for COWs now rests with the EA. The Rivers Tame and Cole (between Cole Hill Lane and the city boundary adjacent to Millfields) are designated “main” rivers and thus fall within the direct responsibility of the Environment Agency. It also should be noted that there are no IDBs (see Figure 1) operating within the council’s area. Under Section 3.8 of the council Policy Statement to reduce and manage the flood risk, the council, acting as the relevant planning authority, have adopted PPG25 (since 2nd October 2008 PPS25) as the key government guidance for development. This guidance “*includes measures for ensuring sustainable urban drainage systems to control surface water runoff*”. The council Policy Statement (Section 4) also recognises the “*need to work in partnership with central government and other operating authorities*” as well as interacting with the public to minimise flood risks and damage.

This latter requirement for wider public and community involvement in the Sustainable Management of Urban Rivers and associated Floodplains was central to the SMURF project (www.smurf-project.info) which had a Birmingham base. This project was concerned with sustainable land use planning and water management within the Tame catchment and the development of two small-scale demonstration sites at Perry Barr. **The main aim of the SMURF project was to develop a methodology for improved land use, planning and water management in a heavily urbanised environment and thus does have strong relevance to the current SWITCH project.**

The generic framework for strategic planning outlined in Figure 2 is that which came into force in England & Wales in September 2004 under the Planning and Compulsory Purchase Act, although it was not formally adopted by Birmingham City Council until October 2005. **Under this new planning system, the city council is required to develop and implement Local Development Frameworks (LDFs), containing a range of Development Plan Documents (DPDs).** The general

structure and components of the planning system and its relation to flood risk assessment are given in Table 2.

Table 2 The Structure of the Planning System and Relation to Flood Risk Assessment (IM Protocol 2.1.7)

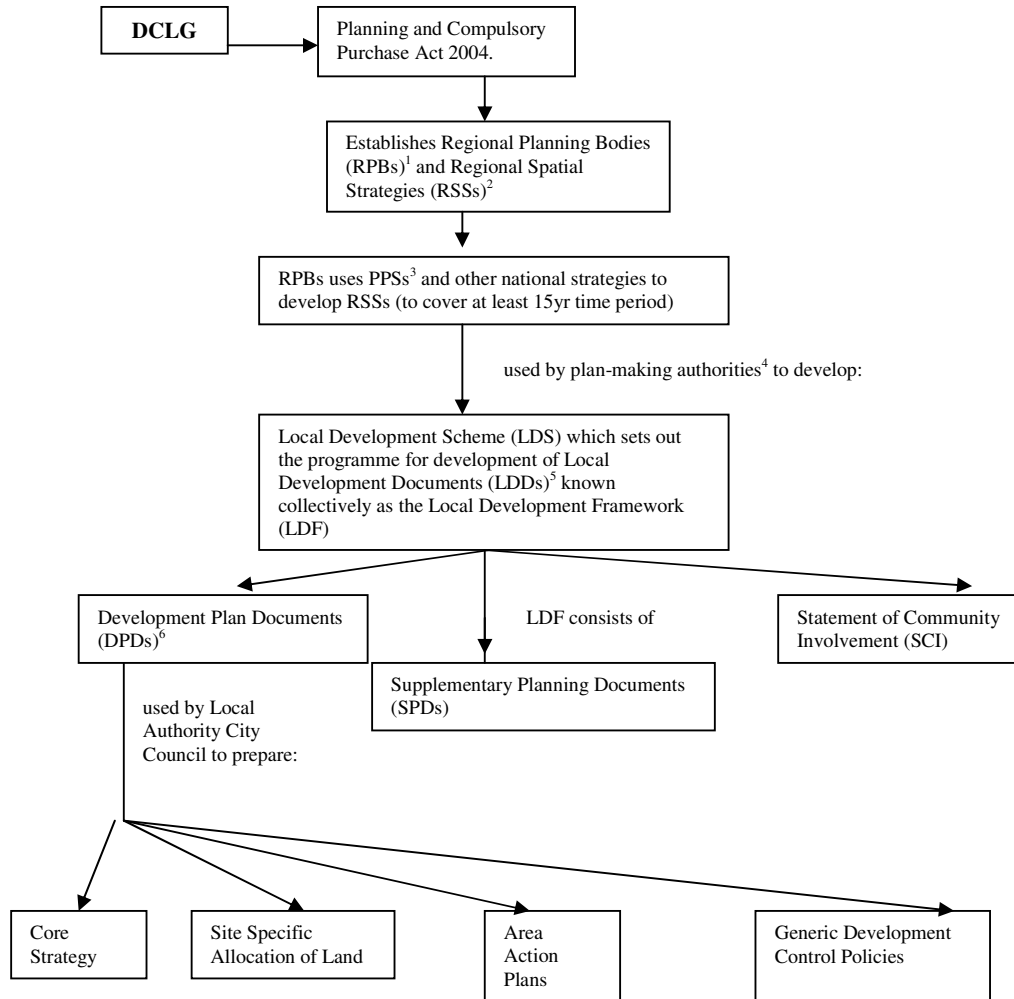
Planning Document	Flood Risk and Water Management
Planning Policy Statement (PPS)	PPS25: “ <i>Development & Flood Risk</i> ”
Regional Spatial Strategy (RSS)	Regional Flood Risk Assessment
Local Development Plan (LDP) <ul style="list-style-type: none"> • Core strategy • Proposal maps • Area development plan • Site specific plan 	Strategic Flood Risk Assessment and Surface Water Management Plan
Supplementary Planning Documents	Supplementary planning guidance documents (including SUDS)
Development Control	Site specific flood risk assessment

The Planning and Compulsory Purchase Act 2004 (‘the 2004 Act’) makes a number of significant changes to the planning system, the most significant of which is a new development plan system that is less complex, more accessible and actively engages the community and stakeholders in the plan making process. The 2004 Act has brought about some important changes to the development plans system. The old system of Local Plans and Structure Plans is replaced with Local Development Frameworks (LDFs) and Regional Spatial Strategies (RSS). The West Midlands Regional Assembly is responsible for preparing the RSS.

LDFs can be described as a portfolio or ‘loose leaf’ series of documents, known as Local Development Documents (LDDs), which together provide the planning framework for development over a period of 15 and 20 years. There are a number of different types of documents that make up the Local Development Framework:

- Development Plan Documents (DPDs); these are statutory plans and are subject to independent examination by a Planning Inspector. DPDs replace existing local plan policies and proposals. DPDs may be in the form of a Core Strategy, the Proposals Map, Site Specific Allocations of Land and Area Action Plans (AAPs) as indicated in Figure 3;
- Supplementary Planning Documents (SPDs); these provide further details on the policies and proposals and are not subject to examination. SPDs may be in the form of design guides, found in the DPDs;
- Sustainability Appraisals (SA); need to be carried out for all DPDs and SPDs.
- Statement of Community Involvement (SCI); sets out the Council’s arrangements for engaging with the general public, private sector businesses and services and other public services such as health and police authorities, in the planning process;
- Annual Monitoring Report (AMR); on the progress of plan preparation and implementation of policies and proposals; and the Local Development Scheme (LDS); set out the programme of work and timescales for preparing the documents that make up the LDF.

The LDS identifies the documents that will be prepared to comprise the LDF, the programme for delivering these documents including those times for public participation and the Council’s overall approach to preparing each LDD.



- Key:
- ¹ RPBs are the regional chamber except in London where it is the Mayor
 - ² RSSs replace Regional Planning Guidance (RPGs)
 - ³ PPS are Policy Planning Statements which will replace Policy Planning Guidance (PPGs)
 - ⁴ District Councils, Unitary Authorities, National Park Authorities, Broad Authorities and County Councils (mineral and waste LDDs only)
 - ⁵ LDDs replace Local and Unitary Development Plans
 - ⁶ RSS and DPDs form the Development Plan

Abbreviations;

1. LA = local Authorities
2. HA = Highways Authorities
3. IDB = Independent Drainage Boards
4. EA = Environment Agency
5. SEPA = Scottish Environmental protection Agency
6. Defra = Department of Environment, Food and Rural Affairs.
7. Ofwat = Office of the Water Regulator
8. BW = British Waterways
9. BWB = British Waterways Board
10. SUDS = Sustainable (Urban) Drainage Systems

Figure 3 The New Planning System in England & Wales (IM Protocol 2.1.7)

The revised Local Development Plan (LDP) recognises the need for water minimisation techniques and states (Section 3.72) that the ***“full potential of sustainable drainage systems (SUDS) must always be reviewed before any rainwater runoff is diverted into sewers or stormwater drains”***. It is expected that control devices will be required for new developments but there is a caveat in respect of direct discharges and infiltration to ground where there is the likelihood of a high water table and/or sensitive groundwater. Section 3.73 states that ***“where feasible, surface runoff and contaminated water should be treated at source through the use of natural features such as reed beds”***. Storm attenuation will require (Section 3.74) the installation of ***“pipes, tanks and balancing ponds”***.

The new planning framework allows flood risk and urban water quality management to be addressed at regional, area and local levels as illustrated in Table 2, although there are still issues remaining over catchment-scale planning. The new LDFs and accompanying action plans provide opportunities for encouraging early liaison and on-going dialogue between developers, local and regulatory authorities, water companies and communities concerning the design and implementation of new developments within a particular area. However, what is not yet clear is the relationship between these local framework and strategic development plans and the RBMPs that will be developed within the context of the Water Framework Directive (WFD), and this may be an important issue for urban drainage planning.

Key points

- *Government guidance “includes measures for ensuring sustainable urban drainage systems to control surface water runoff”*
- *City councils required to develop and implement Local Development Frameworks (LDFs; see Figure 3),*
- *City Local Development Plan states “full potential of sustainable drainage systems (SUDS) must always be reviewed before any rainwater runoff is diverted into sewers or stormwater drains”.*

3.4.1. Master-planning

IM Protocol 2.1.2 the type of behavioural changes that are required.

2.1.10. The internal rules of organisations as these refer to what they must, may and cannot do; as to the procedures they must adopt; and the objectives they are to pursue.

Master-planning can provide the basis for a more holistic and integrated approach to deliver strategic plans at local, regional and catchment scales. Consultation will be a founding basis for the achievement of an acceptable and sustainable master planning process and a pro-active template is already emerging for the collaborative stakeholder design process. This involves planning consultants and facilitators drawn from stakeholder groups (led by the developer and local authority) developing the outline master plan through collaborative technical and community Workshops and Advisory Groups enabling integration of infrastructure with other areas of the development life cycle. Drainage issues can then become an integral component of the development process with building types/locations and site layout being

appropriately amended to better manage flood and receiving water pollution risks.

Key Points

- *Consultation with representatives of stakeholder groups required*
- *Collaborative stakeholder process at the design stage*
- *Master-planning required for more integrated delivery of strategic plans*

3.5. The Water Framework Directive (WFD) (IM Protocol 2.1.7)

The EC Water Framework Directive (WFD) which came into force in December 2000, establishes a new, integrated approach to the protection, improvement and sustainable use of Europe's rivers and groundwaters by introducing two key changes to the way the water environment must be managed by member states. The first relates to the types of environmental objectives that must be delivered. **Previous EU legislation set objectives to protect particular water uses from the effects of pollution and especially against dangerous substances. These types of objectives are taken forward in the WFD provisions for Protected Areas and Priority Substances respectively. The Directive also introduces new, broader ecological objectives designed to protect and, where necessary, restore the structure and function of aquatic ecosystems themselves, and thereby safeguard the sustainable use of water resources.**

The second key change is in the introduction of a river basin management planning system which is relevant to the greater Birmingham Region. This catchment-based planning system will provide the decision-making framework within which costs and benefits can be properly taken into account when setting environmental objectives, with proportionate and cost-effective combinations of measures implemented to achieve them.

The emphasis placed on diffuse pollution (which includes that associated with urban runoff), under Article 1 of the WFD is of particular relevance to urban surface water drainage management. Although the Directive does not define diffuse pollution, it does specify within Articles II.3 (h) and Article II the need to identify and quantify diffuse sources, with Annexes IV and VII requiring estimates and a Programme of Measures (PoMs) for monitoring and control of such diffuse sources within future River Basin Management Plans (RBMPs). These plans will be developed and delivered by the Environment Agency in conjunction with Local Authorities) under the aegis of central government led (Defra) strategic policy. With reference to Article 5 of the WFD, the UK regulatory agencies have undertaken preliminary characterisation (or basic risk assessment) of all water bodies in order to determine the most significant pressures and impacts on the receiving water environment and to assess the likelihood that water bodies will achieve the relevant Environmental Quality Objectives (EQOs). The Article 5 risk assessment map for the Greater Birmingham region indicates that there are considerable lengths of receiving surface waters designated as being "at risk" or "probably at risk". Some of the worst channel reaches may receive designation as "heavily modified" and seek some element of derogation from the WFD ecological criteria within the forthcoming River Basin Management Plans (RBMPs).

The EA assessment framework uses land use activity, source pressure, exposure pressure and impact data in its characterisation with the outcome being expressed in a categorisation of high, moderate, low or no exposure pressure. Urbanisation is considered to constitute a prime source and exposure pressure, although both land use activity and impact data are uncertain at the current preliminary risk assessment stage and will require further information to fully justify appropriate Programmes of Measures (PoMs) for the next RBMP1 stage.

Regulation based on technical performance and stipulated levels of service will undoubtedly require obligatory “Basic Measures” with statutes to conform to the EU Directive including discharge authorisations under approved licensing. **However, it can be expected that a considerable number of measures relating to urban surface water runoff will be dealt with as “Supplementary Measures” embodied in General Binding Rules (GBRs), codes of practice and revised PPS guidance as well as negotiated agreements and awareness raising campaigns.** This pattern is already emerging in Scotland where SEPA has introduced a range of GBRs to control diffuse source flood and pollution risks incorporated within and enhancing the 2005 Controlled Activities Regulations (CARs).

Key points

- *Emphasis placed on diffuse pollution (e.g. urban runoff), under Article 1 of the WFD is of particular relevance to urban surface water drainage management.*
- *Considerable lengths of receiving surface waters in the Greater Birmingham Region designated as being “at risk” or “probably at risk”.*

3.6. Surface Water Drainage Responsibilities and Adoption

IM Protocol 2.1.4 and 2.1.9 Compliance: how far do the formal rules operate in practice?

Whilst there are usually rules, they are often not effective in practice for a wider range of reasons. Some assessments have to be made of how effective are the rules and why they are or are not effective.

3.6.1. Risks and Barriers to Current IUD Management

The background to, and current structure of, the legislative, regulatory and planning framework for urban surface water drainage in relation to the position and responsibilities of Birmingham City Council (BCC) has been outlined in Sections 3.3 and 3.4. Figure 2 illustrates the generic framework which emphasises the complexity and fragmentation of both the legislative and agency responsibilities which serve as a barrier to integrated urban drainage (IUD) management and meaningful stakeholder consultation. The more specific identification of delivery responsibilities within this framework, and the difficulties of achieving a fully integrated approach to urban runoff drainage for the River Rea catchment, has been explored in the context of the Defra Integrated Urban Drainage (IUD) Pilot Study (Birmingham City Council, 2008).

through amendments to legislation, institutional and planning arrangements, some of which are being reviewed at central government level (Defra, 2008). Surface water flooding control has evolved organically and there is a history of cooperation and joint action between BCC, STW and EA in dealing reactively with emergency events. **However, under existing legislative and regulatory frameworks, the boundaries of responsibility and leadership lack clarity which gives rise to clear risks in achieving fully effective and efficient surface water drainage management.**

Figure 5 illustrates the principal barriers and difficulties to achieving an integrated stakeholder consultation process for strategic urban drainage management. There is currently little basis for a structured and systematic adoption and management of surface water facilities within an urban catchment. The various stakeholder organisations and agencies have differing incentives, accountabilities and investment planning horizons, with responsibility for urban pluvial flooding lacking both strategic direction and legislative clarity. There are also clear tensions between the need for promoting urban growth point initiatives and the realisation of capital receipts against the need to achieve effective sustainable drainage and the minimisation of surface flooding risk.

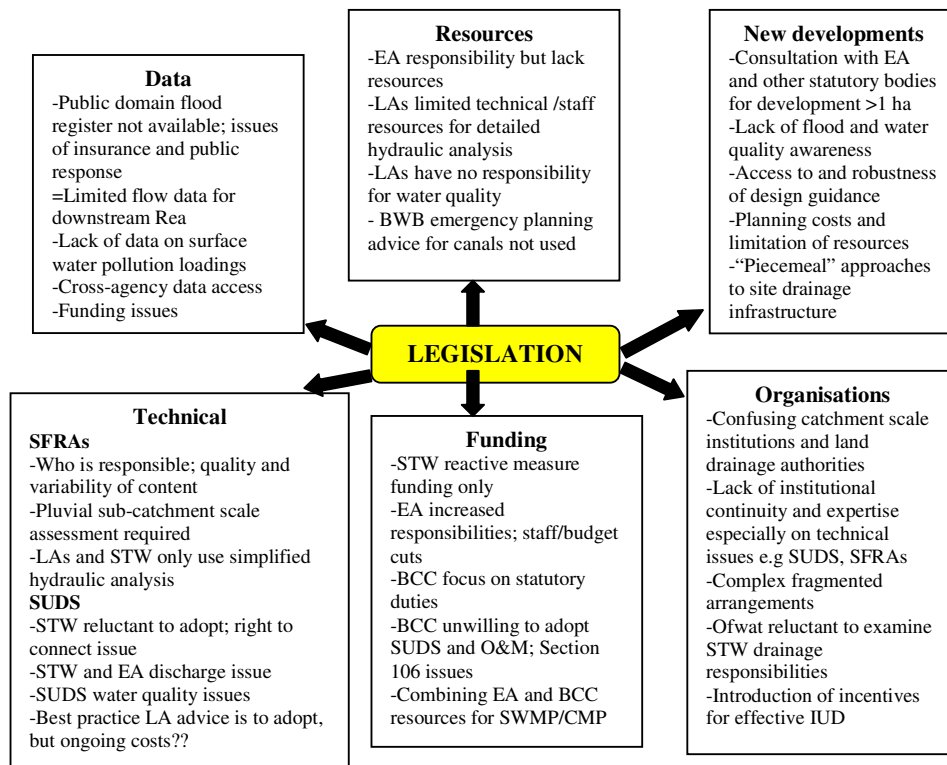


Figure 5. Barriers to Stakeholder IUD within the Rea Catchment.

(After: Birmingham City Council, 2008) (IM Protocol 2.1.9)

Currently, large scale development proposals such as the Eastside regeneration area of 170 ha (with plans for 3500 new dwellings and, business premises planned as themes of learning, technology and industrial heritage) are dealt with on a “piecemeal” or “parcel” basis with drainage essentially addressed at the site/local level with little if

any consideration of the accumulative effect of development streaming on the wider long term, strategic catchment level impacts. The streaming of Eastside proposals over a 5 to 10 year period also causes difficulties in ensuring a progressive, consistent and integrated policy for the differing spatial and temporal development elements. **City Park is being developed separately from Eastside and there is no overall holistic master-plan for integrating the Park within the surrounding individual development parcels. This reduces the opportunities for introducing an integrated surface water drainage programme.** It is intended for example, to supply two of the three water feature areas in the proposed City Park either from potable water or pumped groundwater rather than seeking to re-use stormwater. An attenuation basin fed from surface water drainage could supply all water features in the Park, but it could be difficult to obtain agreement, funding or long term maintenance for this solution. Consultation and advice is therefore typically uncoordinated until the final planning submission stage is reached (and the EA risk assessment matrix completed), by which time modifications and alterations to infrastructure can become difficult and costly.

3.6.2. Future IUSM Management and Risks

The most recent Defra (2008) consultation document on surface water drainage has outlined proposals for Surface Water Management Plans (SWMPs) and SUDS responsibilities which could designate local authorities as the lead agency in the delivery and management of effective urban surface water drainage. **However, a proliferation of plans will not on their own result in an integrated solution, even if delivered through cooperative action.** In particular, SWMPs can either be read as being a required component of CMPs or as a required component of SFRAs, where the EA has responsibility for the former and the LA for the latter. The SWMPs will also need to be related to the River Basin Management Plans (RBMPs) being prepared by the EA. It is clear that the lines of powers and responsibilities, particularly at the boundaries will need to be carefully clarified together with the supporting income streams to underpin these responsibilities and their ongoing delivery and maintenance. The Defra (2008) surface water consultation document links the development of SWMPs with the new requirements of PPS25, which would further favour future surface water responsibility to lie with the LAs. **The establishment and implementation of a formal joint liaison group for flood management (with BCC, STW, EA, BWB, HA and other stakeholders) for SWMP purposes would provide a major step towards the achievement of holistic, integrated surface water management.** The experience of such Flood Liaison Action Groups (FLAGs) in Scotland, and the experience gained under the Defra IUD Upper Rea pilot project and led by Birmingham City Council, would indicate that such integrated and coordinated approaches can be effective.

However, there will still be a need for changes in current legislation and regulation policy for sustainable urban drainage to be achieved in an effective and efficient manner. This includes a revision of the “right-to-connect” and of Section 106 adoption and costing arrangements as well as a review of the distribution of responsibilities to clarify statutory duties and their boundaries for action. It is clear that surface water management has to be considered in the wider framework of integrated water resource management rather than considered in isolation. However, integration tends to pull towards a large

geographical and catchment scale, whilst stakeholder engagement and democratic accountability tends to pull in the opposite localised direction. It is also the case that sustainable integrated drainage without inclusion of the water quality dimension is unachievable. The Defra (2008) surface water consultation document says very little about water quality and at this time there is certainly no thought of yielding responsibility for this dimension of the urban aquatic environment to the local authority. Irrespective of this, BCC has, and will continue to give to developers, water quality advice on urban surface water runoff where appropriate based on their working experience in addition to that provided by the EA and STW.

If LAs are to be the responsible bodies for future surface water drainage management, their resources and capabilities to do the job will need to be ensured. This will require a secure revenue stream, so the obvious logic would be to introduce a specific charge for surface water runoff; removing that element from the “bundle” of charges under the existing sewer charge, and including one for highway drainage. It is therefore appropriate to suggest that surface water drainage and highway drainage should be de-coupled from the general wastewater charge and surface water levies charged by the local authority on the basis of the runoff load or some surrogate thereof such as the impermeable area. In the short term, a large proportion of the revenue raised might well need to be paid out to contracting groups such as STW, BWB, the IDBs etc., to cover their costs of using the existing infrastructure to drain the area. There would also need to be sufficient headroom on the charge level so that incentives could be offered for water minimisation techniques.

3.6.3. Strategy for removing barriers to IUSM

In the context of UK urban drainage however, many organisational barriers are associated with external legal constraints related to the definition of a “sewer”, acceptance of surface discharges to sewers, BMP/SUDS adoption and funding arrangements, incentive charging etc., in addition to definition of clear boundaries and powers of organisational responsibility. The UK Environment, Food & Rural Affairs (Defra) Select Committee on “*Flooding*” (HMSO, 2008) noted that additional barriers were related to how agreed stakeholder forum “responses” were translated into implemented actions on the ground. They asserted that statutory regulation needs to be in place to ensure that coordinated outputs are actioned by identified responsible organisations. This requires a clear steer on which authorities/agencies should take a lead in coordinating agreed stakeholder action and management strategies. **The experience of stakeholder participation forums such as those involved in the previous UK Department of Environment, Food & Rural Affairs (Defra) IUD pilots in Birmingham and Leeds/Bradford, would suggest their value perhaps lies less with identifying and implementing “solutions”, than in the benefits gained from the exploration of the processes and barriers to collaboration.** Future urban drainage management systems are likely to have complex governance arrangements consisting of multiple organisations located at different levels, which will further emphasise the need for intra-and inter-organisational capacity. Focussing on one area of capacity without others is unlikely to result in permanent or widespread change. The links between capacity spheres also need to be considered as these are usually complex and context dependent.

Thus the major impediments and barriers to IUSM are not technology dependent but rather institutional and social, neither of which have been well addressed to date given the emphasis on technology and planning issues within the water industry which are frequently driven by legal and market-led targets.

Key points

- *A Government funded Integrated Urban Drainage study concluded that the current complex organisational arrangements lack clarity and lead to inefficient and piecemeal investment decisions*
- *Barriers to stakeholder group communication (Figure5) and unclear boundaries of overlapping responsibilities require amendments to legislation, institutional and planning arrangements*
- *If LAs are to be the responsible bodies for future surface water drainage management, their resources and capabilities to do the job will need to be ensured.*
- *The major impediments and barriers to IUSM are not technology dependent but rather institutional and social, neither of which have been well addressed to date.*

4. Conclusion

The described institutional map commences at the city level and moves upwards through the layers (IM protocol point 2.1.5). It explains the underlying social norms and conditions in Birmingham (2.1.8), sets out in detail the legislative and regulatory environment (2.1.7) and names the players and their relative power (2.1.4). The range of stakeholders and ‘action spaces’ associated with BMP/SUDS is discussed (2.1.3). The internal rules of organisations (2.1.10) and compliance with these rules is considered (2.1.9) and behavioural changes in the operation of the organisations and institutions are proposed (2.1.2).

Within Birmingham, the ongoing major redevelopment programme provides the opportunities to modernise public and private housing stock and to install source control techniques. BMPs/SUDS are being increasingly considered and included but legislation in England & Wales needs to be adapted to clearly define ownership and maintenance responsibilities and hence encourage more widespread use in line with UK Government guidance.

Master-planning is needed for a more integrated delivery of strategic plans. This includes widespread consultation with representative stakeholder groups starting at the design stage. The existing complex organisational arrangements with regard to legislation, institutional and planning arrangements need clarification to prevent inefficient and piecemeal investment decisions and to facilitate responsible management of surface water drainage in the future.

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APPENDIX 1

SWITCH Learning Alliance Briefing Note 15: Institutional Mapping (draft)



Learning Alliance Briefing Note 15: Institutional mapping (draft)

Prepared by Carmen da Silva, Alistair Sutherland
and Colin Green

Introduction

This briefing note introduces the concept of institutional mapping and outlines its potential contribution to Integrated Urban Water Management (IUWM). It starts by defining institutions, before elaborating the term "institutional mapping" and outlining the methodology. Emerging lessons, the proposed way forward and further sources of information and guidance are provided.

Institutions and IUWM

Institutions are defined as systems of rules, either formal or informal, and those rules define the boundaries of any institution. For the purposes of water management, institutions are also likely to be organisations: the physical embodiment of an institution. Such organisations will have a recognised service or regulatory role in water management (such as a water supply company or a water board), or are able to clearly articulate their interest in water management (such as a water user association). These named entities are recognised to have authority, power and influence in relation to water management.

Who has the power to act, or the power to require their agreement before another can act, depends upon context. Hence, which institutions are involved will depend on which aspect of water management is being considered. Institutions, including their boundaries, are shaped by their historical, geographical and technical contexts. The boundaries for different forms of service delivery relating to water differ spatially as well. The SWITCH (which aims to realise IUWM) is seeking to deliver more integrated water management through a fragmented mosaic of institutions. Delivering integration of water management will therefore involve either designing new institutions to suit the physical boundaries of the systems to be managed, or improving the cooperation or co-ordination of existing institutions. Institutional mapping provides a starting point for either approach.

Why institutional mapping?

Institutional mapping is needed to give insight into institutional and governance structures for urban water management. While more integrated UWM may require new technologies (including planning

Governance shapes the way services are planned, managed and regulated within political social and economic systems. Integrated Urban Water Management is challenging because it requires an improvement in governance, involving traditionally separate sub-sectors or functions of government and civil society. Improving IUWM will require engagement with a complex array of administrative, political, institutional, social, economic challenges in cities.

and management tools and models), it can only be delivered through the relevant institutions who will almost certainly be required to make changes in the way they work, and how they perceive each other. Mapping the existing (formal and informal) power and influence exercised by the relevant institutions, particularly that pertaining to a new technical innovation being considered, is regarded as a key element of the SWITCH approach to facilitating change in the involved cities.

What is institutional mapping?

Institutional mapping links technologies and issues around IUWM with processes, structures and outcomes of decision-making known as governance. It identifies stakeholders with different kinds of power and also examines their source of funding.

A local institutional map identifies which institutions have the power to deliver, fund or otherwise influence the successful up-take of technical measures in order to deliver sustainable urban water management. It focuses on the key actors, their interactions, where power is located, who has the ability to influence decisions, and who makes decisions.

Intra-organisational rules partition what an organisation can do into three sets: what it must do, what it may do, and what it must not do. Institutional mapping focuses upon actions. However, intra-organisational rules (or the constitution) may define specifically what an organisation can do, and the procedures it should adopt, and/or the objectives it is to pursue.

From an institutional delivery perspective, there are three different groups of stakeholders (Figure 1).

Figure 1 Stakeholders in service delivery



Key issues to understand in institutional mapping

It is presumed that no individual organisation can deliver a service alone. Therefore, the effectiveness of any organisation lies in its ability both to influence others and to work effectively with others to address a shared problem or opportunity. The powers and funding to deliver integrated water management may be scattered between different institutions. It is therefore necessary to map out the functional and geographical boundaries and know where the powers and funding to deliver different courses of action reside in a specific city. City institutional maps will identify what institution has which duties and powers, and its funding to do what it has to do, or is empowered to do.

A key issue is the integration of land and water management and how this plays out in cities. Each organisation embodies a set of rules, governing what it does and exists in an environment of rules that determine its relationships with other organisations. This can vary substantially between countries. For example, England and Wales are highly centralised countries with only 420 units of local government, plus around 450 Water User Associations (WUAs), for a population of some 55 million. This compares to the more than 36,000 communes and around 1900 WUAs, plus regions and departments in France; or the 17 Regions, 52 Provinces, 8,101 municipalities, and 6,200 WUAs in Spain.

Although the focus of SWITCH is on cities, city level decision-making and operational decision-making at the sub-city level often is fundamentally influenced and affected by decision-making at regional, national and international levels. The analysis of institutional arrangements which leads to the construction of an institutional map therefore needs to consider each of these levels or layers; the institutional map is multi-layered.

What are the principles of mapping?

Balanced information: Information gathering should use existing studies and official documentation as well as a range of other primary and secondary sources, supplemented and verified by empirical evidence.

Cultural understanding and stakeholder participation: It is a time and labour intensive exercise, which requires proficiency in the local language and an awareness of local cultural and operating practices. A mapping study should involve key local stakeholders, such as those involved in multi-stakeholder bodies (like the local Learning Alliances in SWITCH).

Attention to Informal and Formal Rules: It is much easier to identify the formal systems of rules, expressed in laws and regulations, than the informal systems of rules: those that are expressions of social norms for example. Informal rules are neither noticed explicitly or open to question, but are more important than formal rules.

How can mapping contribute to IUWM?

Institutional Mapping can be a step in exploring space for institutional reform, and organisational change. It should provide insight into the relations between stakeholders including those formally and informally involved in service provision and the users of the services. An institutional map will provide clarity on the articulation of users' needs and on decision making processes, issues related to governance and the opportunities and constraints to achieving integrated urban water management.

By identifying where funding and powers reside, for each proposed intervention strategy and technological solution, institutional mapping can provide the necessary insights for developing realistic plans.

Methodology

Institutional mapping is fundamentally a process of analysis. The methodology for Institutional Mapping has been developed and described in 'institutional arrangements and mapping for the governance of sustainable urban water management technologies; Mapping protocol' by Colin Green of Middlesex University. In the form described it has been applied to Birmingham. Adaptations of this methodology are being and have been tested out in other SWITCH cities.

In brief, there are four groups of tools for institutional mapping:

- Mapping formal definitions of key terms, such as river, sewer etc (these are found in law and administration)
 - Series of questions covering different possible relationships
 - Diagrams showing relationships
 - Diagrams showing technologies
- Having identified the relationships between the organisations, and the organisations who are consequently players, the remaining questions are:
- What are the objectives or interests of those organisations?
 - What rules govern their behaviour, including the procedures which they must adopt in making and implementing decisions?

In the following section, we will describe the objective and scope of the mapping exercise and common issues that arise.

The main elements of an institutional map

The elements of the protocol for institutional mapping are:

1. Specification of the institutional map creator(s) and who is/are institutional map user(s), and the technologies concerned.

2. Clear determination of the purpose of the institutional mapping, including what kind of behavioural changes are required.
3. Specification of the primary, secondary and further 'action spaces' likely to be relevant to the purpose determined and a preliminary identification of how they interact.
4. Know the main players at different levels.
5. Selection of sequencing in which institutional layer mapping is to be presented in the Institutional map.
6. Decide whether the institutional mapping is likely to be different, and therefore presented differently, for each sustainable urban water management technology.
7. What are the 'rules of the game?' i.e. the legislative and regulatory environment including the international level; regulations, guidance, guidelines, codes, administrative procedures, financial arrangements and administrative procedures.
8. The informal 'rules of the game' – the underlying social norms and conditions
9. Compliance: how far do the formal rules operate in practice?
10. The internal rules of organisations.
11. Definitions to lend clarity and precision to the institutional analysis and mapping. A glossary of terms should be provided.
12. Include relevant data and information in the institutional mapping. (such as population size of city, country, Per capita water consumption, Trends, Agency or organisation ownership etc.)
13. Employ a range of methods of presentation and portrayal.

What are lessons to date from doing institutional mapping?

Experience there has revealed that while there are some tools and a general approach expressed as a protocol, there is no cook book which will guarantee an adequate institutional map. Some emerging lessons are:

- Institutional Mapping is a skilled exercise that requires insight into the local context.
- Policy and practice are constantly in a state of change so it is necessary to see what changes are being contemplated.
- Intra-organisational rules partition what an organisation can do into three sets: what it must do, what it may do, and what it must not do. However, that there are rules does not mean that they actually operate.
- Institutional mapping is dependent upon the availability of and access to documents.
- History is important. Prevailing concerns and technologies from the past are reflected in definitions of terms, in laws, regulations and institutions.

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For more information please contact: John Butterworth IRC International Water and Sanitation Centre (jbutterworth@irc.nl) who coordinates the learning alliance work-package within SWITCH, or the authors of this briefing note: Carmen Da Silva (cdasilva@irc.nl), Alistair Sutherland at the University of Greenwich (a.sutherland@gre.ac.uk) and Colin Green at the University of Middlesex (C.Green@mdx.ac.uk).

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