

## Section 5.0 Target Audience Strategies



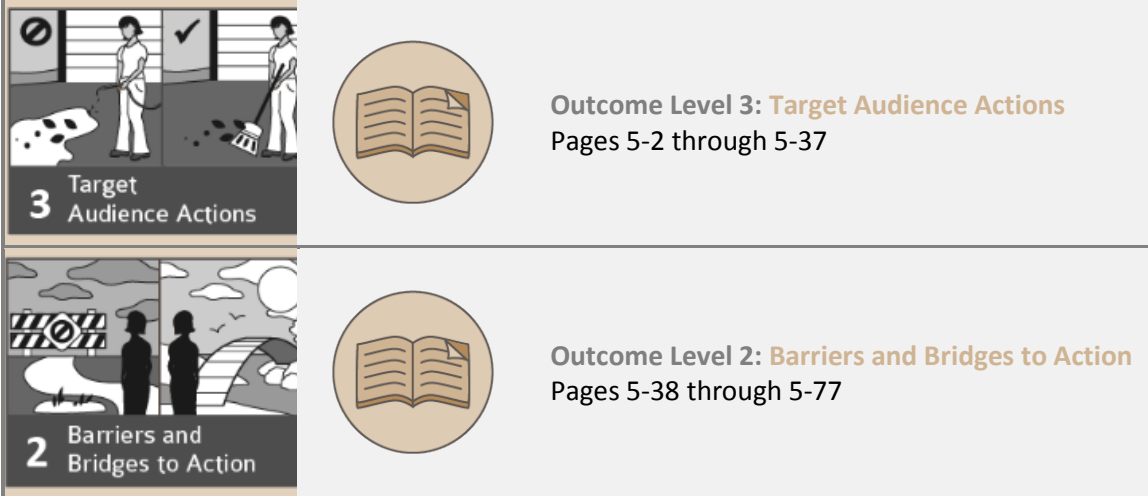
*This section describes the development of **Target Audience Strategies**, the second of four strategic planning components introduced in Section 3.0. Following the identification and prioritization of source contributions described in Section 4.0, target audience planning addresses Outcome Levels 3 and 2. Managers will focus on identifying the people that are responsible for these contributions, and then on characterizing the specific behaviors attributable to them. Ultimately, they will need to know how people should be acting differently and develop a clear understanding of the factors that may be standing in the way of desired changes.*

*Completed Target Audience Strategies will inform the subsequent development of Program Implementation Strategies in Section 6.0, and will inform the subsequent development of Assessment Tools and Strategies in Section 7.0.*

### 5.1 Background

To bring about changes in runoff or receiving water quality, managers must focus their efforts on the people responsible for source discharges. **Target audiences** are the groups or individuals that programs are directed to (e.g., residents, schoolchildren, construction contractors, business operators, or municipal employees). Each of the priority source types identified in **Section 4.0** will have one or more target audiences associated with it. Most often, program activities will be directed to the primary target audiences directly responsible for source contributions, i.e., those engaging in pollutant generating activities (PGAs) or with the potential to implement best management practices (BMPs). But managers sometimes also need to address secondary target audiences that can play a supporting role in bringing about change (e.g., by conducting industry trainings, or reporting pollution). This section deals with identifying and characterizing the attributes of target audiences, and in understanding their behaviors and the factors that influence them.

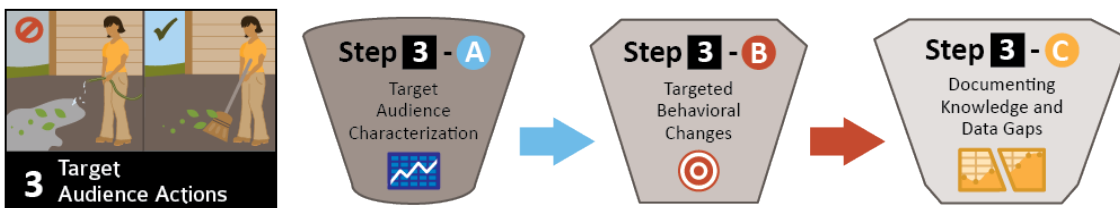
This section addresses the **PEOPLE** responsible for the source contributions discussed in **Section 4.4**, the behaviors that contribute to them, and the factors that influence behavioral patterns.



**Figure 5.1 Primary Components of Target Audience Strategies**

## 5.2 Outcome Level 3: Target Audience Actions

Water quality improvements can usually be achieved only when specific actions have occurred in one or more target audiences. The methods and approaches described in this section follow the premise that a combination of target audience actions is needed to materially affect these changes. Selection of target audiences is one of the most crucial parts of the strategic planning process.

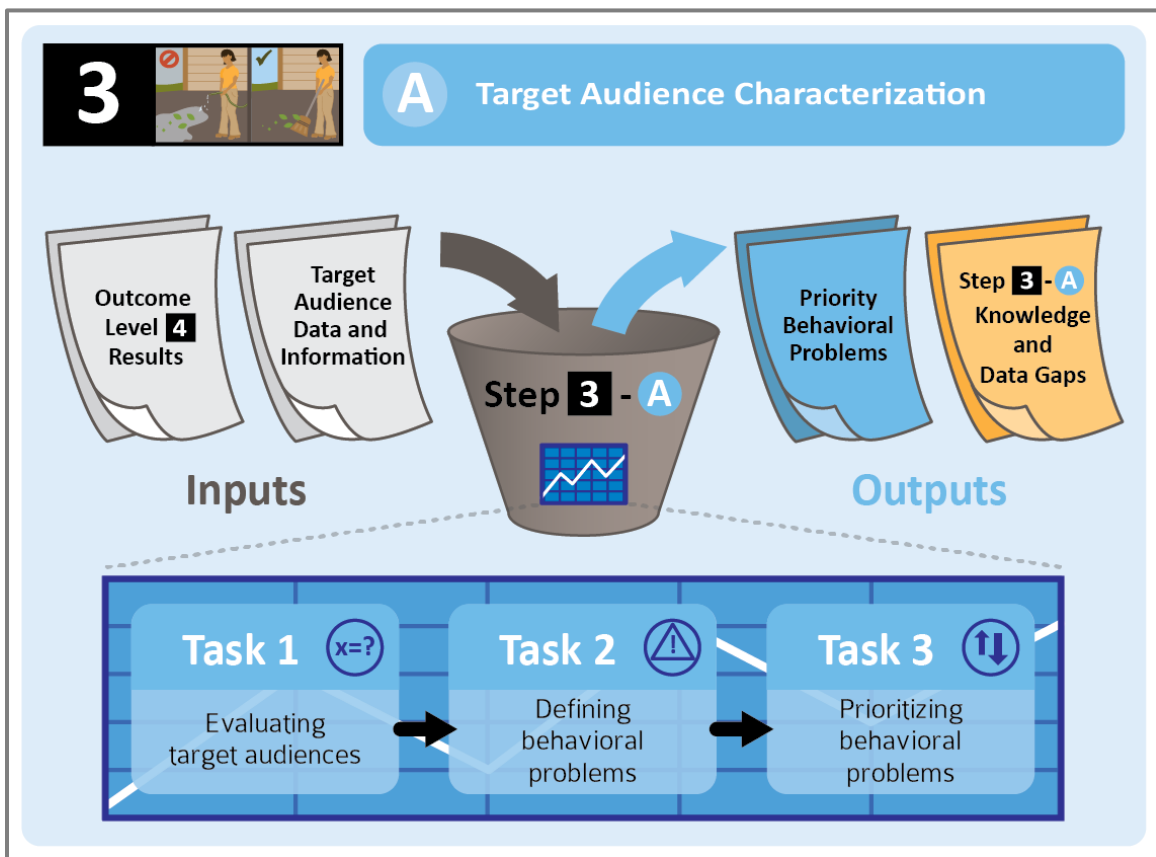


As shown here, Level 3 planning consists of three steps. In **Step 3-A** managers will identify, prioritize, and learn as much as they can about the target audiences that they believe are responsible for the identified priority source contributions. This will initially include looking into their behavioral patterns, but further consideration of other attributes (gender, ethnicity, income, education, etc.) will also help to provide a basis for later planning steps. Once priority target audiences and behaviors are identified, specific changes in them will be targeted in **Step 3-B**. Finally, since detailed data and information on target audience

behaviors are often likely to be lacking, knowledge and data gaps will be summarized and documented in **Step 3-C**.

 **Step 3 - A** Target Audience Characterization

The purpose of this step is to determine who stormwater program activities should be directed to, and to characterize their behaviors and general attributes. As shown in **Figure 5.2**, target audience characterization consists of three tasks. Characterization begins with the identification of the people who are responsible for identified source contributions. Target audience behaviors will then be identified and narrowed to those considered to represent problems that may warrant resource commitments.



**Figure 5.2: Target Audience Characterization (Step 3-A)**

**Table 5.1** identifies many of the inputs that can inform Level 3 strategic planning. The first of these are Level 4 planning results, which can include any of the items listed. Source priorities will already have been at least provisionally identified, but may change as new information is considered during Level 3 planning. Likewise, potential target audiences

that may have already been identified should be considered further. A variety of other sources, e.g., inventories, surveys, and historical compliance results, can also help to provide insight into target audiences.

**Table 5.1: Potential Inputs for Level 3 Strategic Planning**




<p><b>Outcome Level 4 Planning Results</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Priority source(s)</li> <li><input checked="" type="checkbox"/> Source characteristics (pollutant loadings, hydrology, and other)</li> <li><input checked="" type="checkbox"/> Potential target audiences (if identified)</li> <li><input checked="" type="checkbox"/> Outcome Level 4 knowledge and data gaps</li> </ul> <p><b>Other Target Audience Data and Information</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Existing programs (annual reports, records and documentation, etc.)</li> <li><input checked="" type="checkbox"/> Interviews, surveys, tests, and quizzes</li> <li><input checked="" type="checkbox"/> Facility or site inspections</li> <li><input checked="" type="checkbox"/> Complaint investigations</li> <li><input checked="" type="checkbox"/> Pollution reports and referrals (hotline, employee, contractor, etc.)</li> <li><input checked="" type="checkbox"/> Third parties (submission of compliance data, maintenance records, etc.)</li> <li><input checked="" type="checkbox"/> Business, site, facility databases (Tax assessor, Dunn and Bradstreet, etc.)</li> <li><input checked="" type="checkbox"/> Population, demographic data (census bureau, associations of governments, etc.)</li> <li><input checked="" type="checkbox"/> Business, employee associations and organizations, homeowner and renters associations</li> <li><input checked="" type="checkbox"/> Other regulatory programs (hazardous materials, fire, recycling, planning, etc.)</li> <li><input checked="" type="checkbox"/> GIS, aerial photography, land use maps, etc.</li> <li><input checked="" type="checkbox"/> Special investigations (community-based social marketing studies, etc.)</li> <li><input checked="" type="checkbox"/> Published or unpublished research, literature, and technical reports (CASQA BMP Manuals, etc.)</li> <li><input checked="" type="checkbox"/> Other (TBD as needed)</li> </ul>
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## **Task 1 Evaluating Target Audiences**

Managers will first identify and evaluate the target audiences with the potential to impact priority source contributions. At this point all potential target audiences should be of interest. Data and information will initially be reviewed to address the four key questions below for each potential target audience. This process needn't be repeated in its entirety

for every target audience since they can often be similar or the same for multiple source types.

 <b>Step 3-A Task 1 Key Questions</b> Evaluating Target Audiences		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Available Data, Information, and Results</b>  	<b>Question 1:</b> Which target audiences are associated with priority source contributions?  <b>Question 2:</b> What are the behavioral patterns of target audiences?  <b>Question 3:</b> How are behaviors changing over time?  <b>Question 4:</b> What are the characteristics of target audiences?	<b>Target Audience Behaviors and Characteristics</b>  

### **Question 1 Which target audiences are associated with priority source contributions?**

Once priority source contributions have been identified, it's necessary to know who is responsible for them. This can initially be approached by considering the target audiences associated with general source categories and types. It's helpful to consider how target audiences differ from populations. A **population** is any group of people within a defined area or sharing one or more common attributes (race, gender, class, etc.). A **target audience** is a group of people that stormwater program activities are directed to. While the two can be the same, often they are not. For instance, the residential population within a jurisdiction may be segmented into multiple target audiences (schoolchildren, renters, dog owners, automotive enthusiasts, etc.), each potentially requiring completely different intervention strategies.

It's important to be specific when defining target audiences since any of them can have vastly different characteristics and polluting behaviors. A good place to start is with the broad source categories previously identified in **Section 4.2**. As shown in **Table 5.2**, each of these has a number of specific target audiences potentially associated with it.

- **Residential target audiences** tend to be large and varied, so segmentation according to common characteristics or traits (home ownership, hobbies, income levels, ethnic background, etc.) can be important. This contrasts with other source categories, where

target audiences are aligned primarily with places of employment and specific job responsibilities. It can take some additional effort to determine how to segment residential target audiences.

**Table 5.2 Examples of Target Audiences by General Source Category**

<b>Residential Sources</b>	
Do-it-yourselfers (e.g., gardening and yard care; home improvement; power washing; vehicle washing, maintenance, and repair)	Pet owners
Service providers (commercial operations corresponding to same activities as above)	Livestock owners
	Smokers
	Recreational water users (swimmers, surfers, etc.)
	Schoolchildren
	Hotline callers
<b>Municipal Sources</b>	
Garbage collectors	Waste water collection and water distribution maintenance staff
Street maintenance staff	Animal control staff
Park and grounds maintenance staff	Law enforcement staff
Building maintenance staff	Flood control or reclamation district maintenance staff
Grading plan or permit reviewers	Hazardous materials inspectors
Grading or construction inspectors	
Industrial and commercial business inspectors	
<b>Industrial and Commercial Sources</b>	
Owners	Mobile operators
Managers and supervisors	Contractors (landscaping, parking lot sweeping, etc.)
Employees (skilled workers and laborers)	Industry associations
	Employee unions
<b>Construction Sources</b>	
Owners	Contractors (plumbing, etc.)
Developers	Skilled workers
Planning groups	Laborers
<b>New Development and Redevelopment Sources</b>	
Engineers and architects	Developers
Landscape architects	Housing authorities
Urban planners	Flood control or reclamation district planners
Engineers	

- **Municipal target audiences** correspond to sources and activities that are usually under the control of government or agency employees, contractors, or leaseholders. The specific

job functions of these parties normally define their potential for polluting and the roles they play in implementing controls. Field personnel generally have a direct role in implementing BMPs, but supervisors, managers, and office workers can also contribute in a variety of ways (e.g., scheduling activities, conducting training, or obtaining support from elected officials).

- **Commercial and industrial target audiences**, while different in their functions, are similar to those for municipal sources. Roles and responsibilities typically correspond closely to specific job functions. A challenge for addressing commercial and industrial businesses is that they vary widely according to business type. Industry associations can play an important role in supporting BMP implementation through activities such as regulatory tracking and advocacy or providing education and training.
- **Construction target audiences** are often responsible for very different pollutants and impacts than those associated with existing development. Specific target audiences are diverse. While field personnel are usually directly responsible for on-site activities, managers, site supervisors, inspectors, and owners can all play a role in supporting or implementing BMPs.
- **Land development target audiences** are those associated with the permanent post-construction features of new development and redevelopment sites. Examples include engineers, architects, planners, and transportation and housing authorities.

Additional segmentation and refinement of target audiences will be possible as behavioral patterns and other attributes are identified throughout the remainder of this task.

## **Question 2 What are the behavioral patterns of target audiences?**

Although other target audience attributes will be explored later, managers should start by evaluating their behaviors. Since behavioral patterns define the potential of a target audience to generate source contributions, defining them up front can prevent unnecessary effort later. Other attributes can be considered later once it's determined that the target audience is of continued interest.

### **Types of Target Audience Behaviors**

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To understand behavioral patterns, it's first necessary to look at the nature of the behaviors themselves. Target audience actions can be considered according to three general categories. These are introduced in **Table 5.3** and explored in detail below.

**Table 5.3: Three Primary Types of Target Audience Actions**



**Pollutant-generating activities (PGAs)** are behaviors that contribute pollutants or increase flows to runoff. In this illustration, a woman is using a hose to clean up an outdoor area. If other precautions are not taken to prevent flows and pollutants from leaving the site, this action is likely to be a PGA.



**Best management practices (BMPs)** are practices designed to prevent, reduce, or eliminate discharges of pollutants and flow. Here the woman has instead chosen to use a broom for cleaning up. Dry sweeping methods are an excellent example of choosing a BMP over a PGA.



**Supporting behaviors** are actions that encourage or facilitate BMP implementation. Supporting behaviors can be initiated by virtually anyone; in some cases, by dischargers (facility self-inspections, staff training, etc.) and in others by interested parties (pollution reporting, joining an environmental advocacy group, etc.).

### 1. Pollutant-generating Activities (PGAs)

PGAs are the behaviors that contribute pollutants to runoff (i.e., rinsing off a sidewalk or other surface with material such as sediment, trash, or vegetation on it). Their reduction or elimination is the primary focus of stormwater management programs. PGAs are not always the result of current behaviors. Sometimes they existing features that have resulted from past practices, or in other instances discharges that are not directly attributable to a specific behavior. Examples include erosion of exposed areas, deposits of legacy pollutants (e.g., PCBs), and overland discharges from large areas. For simplicity, the term PGA is used to describe any current activity or existing feature that generates pollutants or flows. It's important to consider all likely PGA contributions in developing BMP implementation strategies.

Because PGAs tend to be situational and location-specific, a definitive classification of them does not exist. Anything with the potential to contribute pollutants or increase flows to runoff can be a PGA, and our understanding of them is constantly evolving. **Table 5.4** provides an overview of potential PGA types associated with a range of sites, facilities, and operations. It should be emphasized that none of these activity types represents an actual PGA unless it is implemented in a way that results in a discharge of pollutants or flows. In



practice, managers must often direct program activities to suspected or potential PGAs under the assumption that they are actually causing discharges.

In evaluating potential PGAs, it's important to consider the specific pollutants or stressors associated with each. Since source loadings are defined by the collective input of all applicable PGAs, managers will need to consider which ones are contributing to specific pollutant or flow impacts, and what the relative impact of each is. It can sometimes be challenging to determine this with confidence since our knowledge of PGAs is often based on a general knowledge of the activities rather than actual data on discharges.

General PGA profiles can be extremely helpful for understanding their relationships to specific pollutants or stressors, but managers should be aware of the difference between potential and actual generation of pollutants. Just because a PGA has the potential to discharge a pollutant doesn't mean that it does. Overly-inclusive assumptions about polluting potential based solely on general profiles can result in program resources being directed where they may not be contributing to the resolution of an actual problem.

Despite the importance of standardized information, managers should continually seek to expand their knowledge of specific PGA discharges. Where they are obtainable, local site-specific data should always be preferable to standardized profiles. It may be necessary to address such gaps as part of future data collection strategies.

#### 1. **Best Management Practices (BMPs)**

**Best Management Practices** are activities or other controls that are implemented to reduce or eliminate discharges of pollutants and flow. BMPs can take a variety of forms (source controls, treatment controls, prevention, infiltration, etc.), all of which may be considered as potential alternatives to PGAs. The substitution of BMPs for PGAs can be a key measure of program success. Stormwater Management Programs seek to bring about the implementation of a wide variety of structural and non-structural BMPs by target audiences. Specific examples include picking up after pets, modifying irrigation or pest control practices, slope stabilization, and treating runoff with structural controls.

**Table 5.4: Examples of Potential Pollutant Generating Activities (PGAs)**

<b>Materials and Wastes</b>	
<b>Materials Management, Storage, and Disposal</b>	
<ul style="list-style-type: none"> <li>Materials loading &amp; unloading</li> <li>Liquid container storage</li> </ul>	<ul style="list-style-type: none"> <li>Outdoor storage of raw materials, products, &amp; byproducts</li> </ul>
<b>Waste Handling, Storage, and Disposal</b>	
<ul style="list-style-type: none"> <li>Hazardous waste</li> <li>Solid waste</li> <li>Food grease and oil</li> <li>Pet waste and manure</li> </ul>	<ul style="list-style-type: none"> <li>Liquid waste</li> <li>Sanitary waste</li> <li>Green Waste</li> <li>Recyclable &amp; reusable materials</li> </ul>
<b>Vehicles and Equipment</b>	
<b>Vehicle and Equipment Fueling</b>	
<b>Vehicle and Equipment Storage</b>	
<ul style="list-style-type: none"> <li>Outdoor vehicle storage</li> </ul>	<ul style="list-style-type: none"> <li>Outdoor equipment &amp; parts storage</li> </ul>
<b>Vehicle and Equipment Washing and Cleaning</b>	
<ul style="list-style-type: none"> <li>Vehicle washing</li> </ul>	<ul style="list-style-type: none"> <li>Equipment cleaning</li> </ul>
<b>Vehicle and Equipment Repair, Maintenance, and Servicing</b>	
<ul style="list-style-type: none"> <li>Vehicle &amp; equipment maintenance</li> <li>Vehicle &amp; equipment repair</li> </ul>	<ul style="list-style-type: none"> <li>Changing vehicle fluids</li> <li>Outdoor process equipment operation &amp; maintenance</li> </ul>
<b>Outdoor Areas (Use, Operation, Maintenance, Repair, and Construction)</b>	
<b>Buildings and Grounds</b>	
<ul style="list-style-type: none"> <li>Landscaping &amp; gardening activities</li> <li>Pesticide &amp; fertilizer application</li> <li>Pool, spa, and fountain maintenance</li> <li>Rooftop &amp; downspout maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Sidewalks, break areas, &amp; public areas</li> <li>Pressure washing</li> <li>Contaminated or erodible surfaces</li> <li>Earth moving activities</li> </ul>
<b>Parking Areas and Driveways</b>	
<ul style="list-style-type: none"> <li>Use &amp; Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Sweeping &amp; cleaning</li> </ul>
<b>Driveways, Roads, and Streets</b>	
<ul style="list-style-type: none"> <li>Road and Street Use and Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Driveways</li> </ul>
<b>Storm Drain Systems</b>	
<ul style="list-style-type: none"> <li>Storm drain operation &amp; maintenance</li> <li>Treatment control BMP maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Illicit discharges &amp; connections</li> </ul>
<b>Other Specific Operations and Activities (Examples)</b>	
<ul style="list-style-type: none"> <li>Animal grooming &amp; washing</li> <li>Casting, forging, or forming</li> <li>Chemical treatment</li> <li>Fire sprinkler testing &amp; maintenance</li> <li>Cutting, trimming, or grinding</li> <li>Dust &amp; particulate-generating activities</li> <li>Fabrication</li> <li>Fire hydrant, tank, &amp; hose testing and maintenance</li> <li>Floor, mat, &amp; surface cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Food preparation</li> <li>Mixing</li> <li>Painting or coating activities</li> <li>Pesticide / chemical product formulation</li> <li>Recreational uses</li> <li>Special events</li> <li>Wastewater treatment</li> <li>Weed abatement / vegetation clearing</li> <li>Welding</li> </ul>

In many instances, a basic understanding of BMP implementation (rates, efficiency, etc.) is necessary to estimate source loadings from a site or facility. BMP Implementation is one of the most important objectives of a Stormwater Management Program since it represents a crucial linkage to Level 4 outcomes. That is, reductions in pollutants or flows from targeted sources can't be estimated without some understanding of BMP implementation. **Table 5.5** introduces and briefly describes the major categories of BMPs.

**Table 5.5: General Types of Best Management Practices (BMPs)**

Type of Behavior	Description
<b>Source Control BMPs</b>	Source control BMPs help keep pollutants from coming in contact with stormwater. They are extremely varied and their selection will normally be tailored to the specific source type.
<b>Low Impact Development (LID) BMPs</b>	LID BMPs are site design practices that minimize runoff and maximize infiltration opportunities for runoff.
<b>Treatment Control BMPs (TCBMPs)</b>	TCBMPs are controls that help remove pollutants from stormwater. They can be used in a variety of applications.
<b>Flow Control BMPs</b>	Flow control BMPs reduce discharges that can have a detrimental effect on receiving waters. Consequently, they are often designed for a higher range of storm sizes than treatment controls. Multiuse facilities can incorporate both flow control and treatment control BMPs.

While there is no single definitive source of BMP information, or classification of types, the CASQA BMP Manuals are recommended resources. Each BMP Manual provides specific, source-based information on a wide range of PGAs and BMP alternatives. These critical resources provide additional guidance on the selection, design, implementation, and maintenance of specific BMP options.

## 2. Supporting Behaviors

**Supporting Behaviors** include a wide range of potential actions that are distinct from BMP implementation, but that help to form a bridge toward it. Examples include joining a watershed organization, calling a stormwater hotline, conducting employee training, or developing a Stormwater Pollution Prevention Plan. All of these actions are likely to facilitate the implementation of BMPs by target audiences. A number of supporting behaviors are valuable endpoints in their own right, or serve as “bridges” to BMP implementation over time. Examples of supporting behavior types are shown in **Table 5.6**.

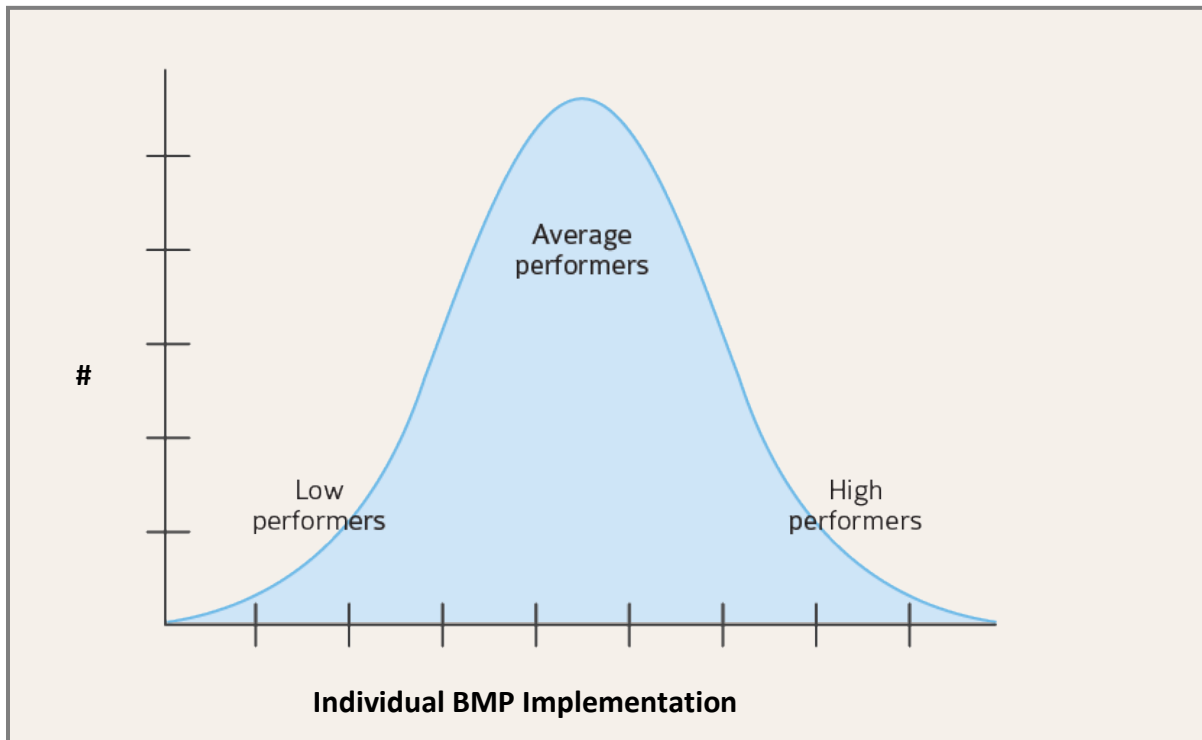
**Table 5.6: Examples of Supporting Behaviors by General Category**

<b>Type of Behavior</b>	<b>Description</b>
<b>Information seeking</b>	<p>Programs often seek to direct target audiences to websites or hotlines as a means of gaining access to additional information. Knowledgeable individuals may often be more likely to avoid polluting behaviors or to implement BMPs. Examples of information-seeking behaviors include:</p> <ul style="list-style-type: none"> <li>• Hotline requests for information (brochures, event schedules, etc.)</li> <li>• Downloads of materials via websites</li> <li>• Attendance at public events</li> </ul>
<b>Pollution reporting</b>	<p>Reporting of potential illicit connections, illegal discharges, and other violations assist Stormwater Management Program staff in identifying potential problems. Examples of reporting behaviors include:</p> <ul style="list-style-type: none"> <li>• Hotline reporting of illicit discharges</li> <li>• Website reporting of illicit discharges</li> <li>• Staff or agency referrals</li> </ul>
<b>Participation and involvement</b>	<p>Stormwater Management Programs often encourage individuals to get involved with the program or in other local efforts. By encouraging a higher level of engagement, it is hoped that increases in BMP implementation will ultimately be achieved. Examples of reporting and participation include:</p> <ul style="list-style-type: none"> <li>• Participation in creek cleanup events, citizen monitoring, weed abatement, etc.</li> <li>• Involvement in non-governmental organizations (NGOs), community groups, etc.</li> <li>• Attendance at public meetings</li> </ul>
<b>Administrative and procedural behaviors</b>	<p>Businesses and organizations often engage in a variety of tasks aimed at fostering or ensuring compliance, and ultimately in bringing about BMP implementation. Examples include:</p> <ul style="list-style-type: none"> <li>• Development of Stormwater Pollution Prevention Plans (SWPPPs)</li> <li>• Employee training</li> <li>• Discharge monitoring</li> <li>• Self-inspections</li> <li>• Changes to operating procedures</li> <li>• Internal proposal writing and advocacy</li> <li>• Grant writing</li> <li>• MOU and cooperative agreement development</li> <li>• Contract development</li> <li>• Regulation review and comment</li> </ul>

## Variability of Behaviors

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It may sometimes be convenient to approach defined populations (commercial operators, residents, construction site workers, etc.) as homogenous groups of individuals with more or less the same traits. However, variability should be expected in any population, and it's important to account for these differences in the identification and characterization of target audiences. Consider the example illustrated in **Figure 5.3** in which the BMP implementation<sup>1</sup> of individuals is found to be normally distributed<sup>2</sup>.



**Figure 5.3: Hypothetical Distribution of BMP Implementation by Construction Workers**

This distribution could apply to any of the source categories described above, but for illustration it's presumed to represent levels of BMP implementation by construction site workers within a jurisdiction. As shown, a majority of workers will tend to be represented in the center portion of the curve, which has important implications for managers wishing

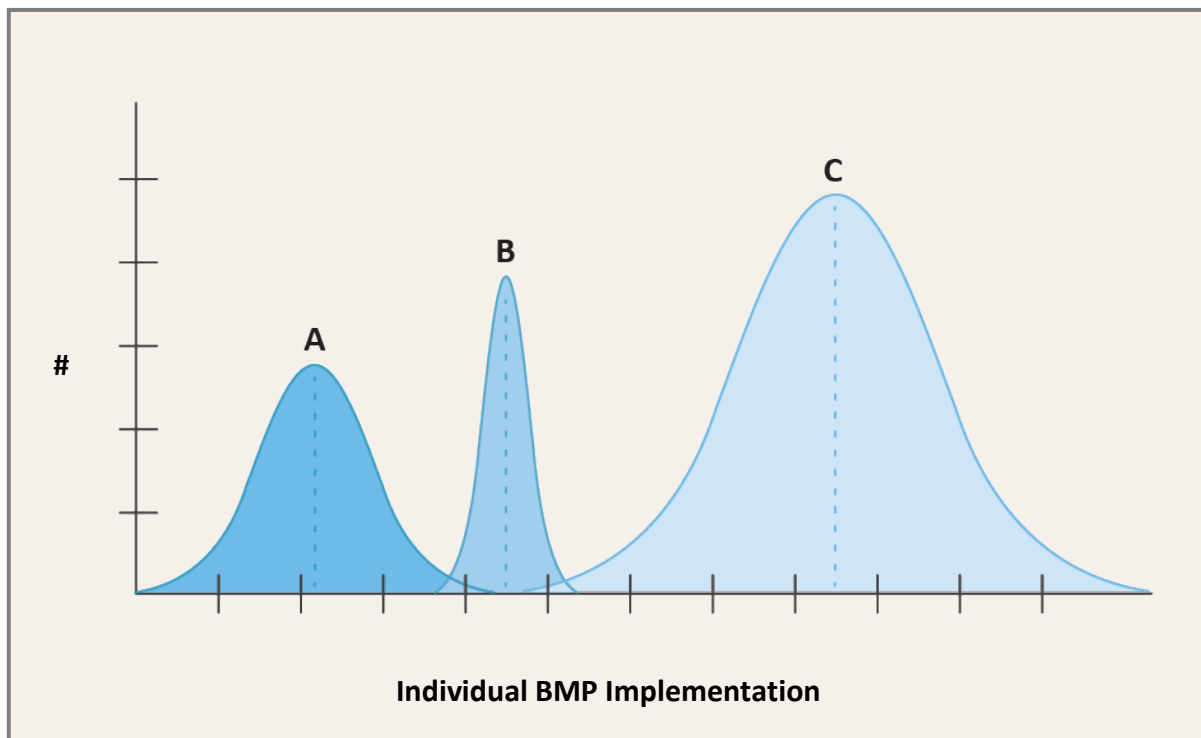
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<sup>1</sup> This is an intentionally vague metric meant only to describe positive behavioral patterns within a population. It could be expressed more specifically as rates, numbers, or magnitude of BMPs implemented, or associated load reductions.

<sup>2</sup> Not all attributes are distributed normally as in this example. For instance, many are positively or negatively skewed, and others are bimodal. Regardless of the actual distribution, this figure is intended to illustrate the differences of individuals within a group.

to maximize BMP implementation across the entire population. Often the smaller numbers of individuals on the tails of the curve tend to act very differently than those in the middle. For example, those on the left might represent the “bad actors” for which higher levels of enforcement are typically needed. Conversely, those on the right are already performing at a high level, and likely do not warrant significant resource commitments. To maximize return on investment, managers benefit from understanding the specific attributes of individuals toward the center of the curve, and how program implementation strategies can best be directed to them. This should not be interpreted to mean that the tails of the curve are unimportant, only that understanding differences between individuals within a population is necessary in the designation of specific target audiences.

Another important aspect of variability is that associated with differences between discrete groups (or sub-populations) within a larger population. **Figure 5.4** illustrates a hypothetical example of a population that has been segmented to reflect differences in the traits of three groups within the larger population.



**Figure 5.4: Hypothetical Differences in BMP Implementation by Sub-populations of Construction Workers**

Assuming the same population of construction site workers represented in **Figure 5.3**, this might be represented as follows:

- A = General contractors
- B = Skilled workers
- C = Laborers

Because the specific involvement and on-site responsibilities of each group varies, their overall contribution to the implementation of BMPs can also be different. This is not intended to imply that one group is outperforming another, just that implementation strategies can be better directed if managers understand these differences. For example, increasing BMP outreach or training for groups A and B might have a lesser return on investment than doing so for group C.

### Relationships between Behaviors

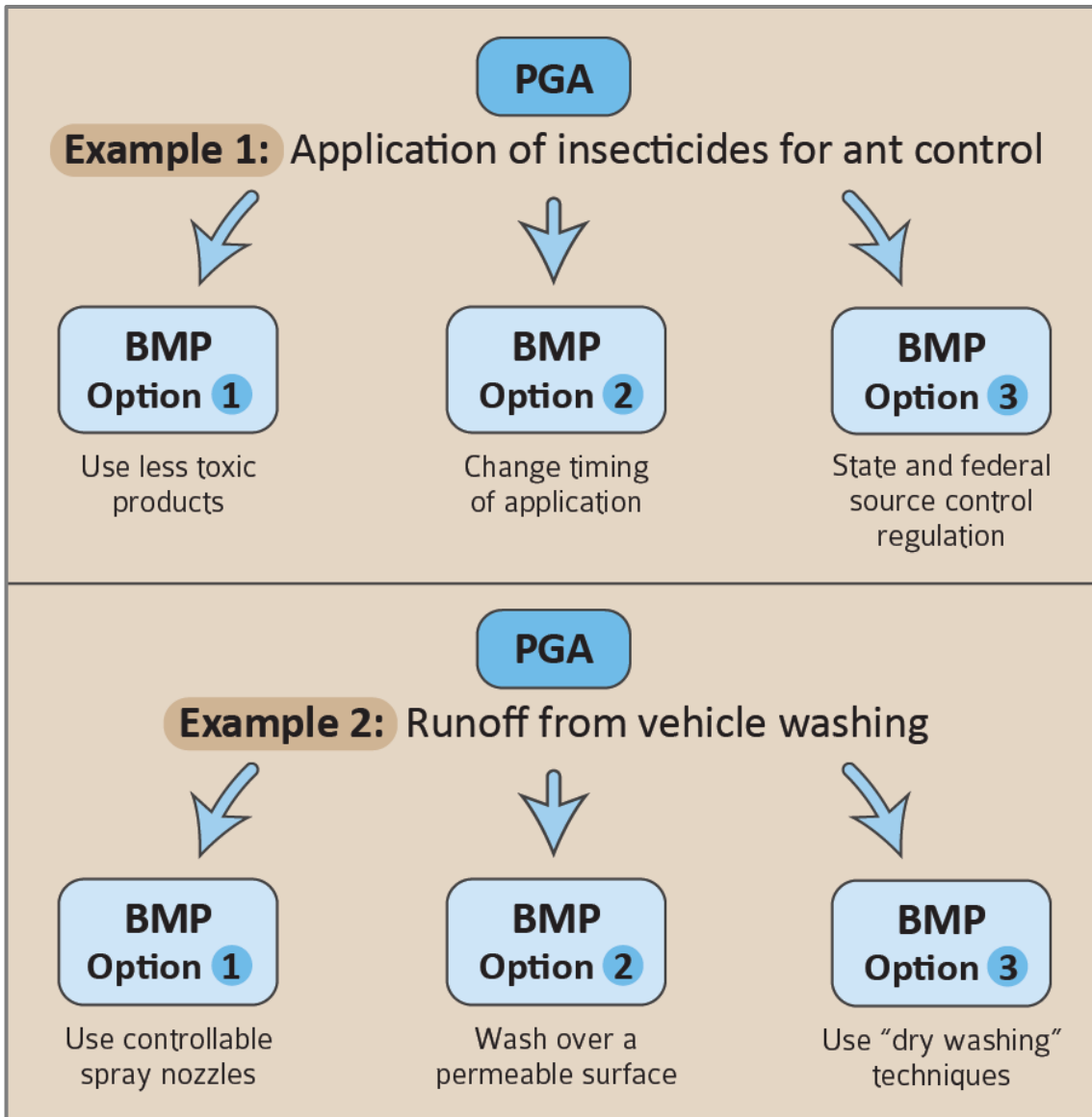
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Now that a range of behavioral types has been presented, their relationships to each other should also be considered. In particular, managers should consider PGAs and BMPs as coexisting in related groupings that are focused on common target audiences or source contributions. That is, each identified PGA for a particular target audience will have one or more BMP alternatives associated with it<sup>3</sup>. Collectively, these behaviors constitute **PGA-BMP packages**. These packages will be an important organizing principle for much of the remainder of this planning process.

Two examples of PGA-BMP packages are illustrated in **Figure 5.5**. In Example 1, application of currently registered insecticides for ant control is the PGA and three BMP alternatives are identified. It's important to emphasize that the PGA is real, but the BMP alternatives are just conceptual since program activities are not yet in place to facilitate their implementation. The two behavioral types are in opposition, and success will be achieved when the collective benefit of the BMP alternative meets or exceeds the impact of the PGA. This concept will be explored in greater detail when changes are targeted in later planning steps. Of course, this is a simple example, and actual combinations of behaviors can be much more complex. Example 2, centers on vehicle wash water. Together, they illustrate a general approach for grouping related behaviors.

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<sup>3</sup> Supporting behaviors can also be included in these packages. However, to avoid complicating the discussion only PGAs and BMPs are discussed here.



**Figure 5.5: Examples of PGA-BMP Packages**

### **Question 3 How are behaviors changing over time?**

It's also necessary to consider whether behaviors vary, or are increasing or decreasing, over time. Understanding the temporal patterns of behaviors will later be useful when targeted changes and implementation strategies are explored. Behaviors can vary on a number of timeframes. To illustrate, **Table 5.7** provides a range of examples.



**Table 5.7: Examples of How Behaviors Vary Over Different Timeframes**

Timeframe	Examples
Hourly (time of day)	<ul style="list-style-type: none"><li>• Walking dogs in the morning or evening</li><li>• Watering lawns early in the morning</li></ul>
Daily (day of week)	<ul style="list-style-type: none"><li>• Washing vehicles on weekends</li><li>• Conducting business operations Monday through Friday</li></ul>
Weekly, monthly, or seasonally (wet/dry)	<ul style="list-style-type: none"><li>• Channel maintenance outside of tern nesting season</li><li>• Doing yard work in the summer</li></ul>

Behavioral patterns can also change over time. Trend estimation can be used to evaluate whether PGAs are decreasing or BMPs increasing as a result of program implementation. The setting in which a particular behavior exists can significantly influence the potential timeframes these changes. For instance, behaviors might change relatively quickly when programs exert direct control (e.g., through building or grading permits), less rapidly in more complex regulatory setting like business compliance, and even slower in the residential sector where program influences are often the weakest. Changes can also be temporary. For example, the exterior use of architectural copper might increase as a result of an increase in the renovation of historic buildings, but later decline with market changes or as other trends emerge.

#### **Question 4 What are the characteristics of target audiences?**

In Question 2, managers looked at the behaviors of target audiences. Once it's been determined that a target audience warrants additional consideration (i.e., its behaviors are considered to contribute to priority source loadings), it's helpful to consider other applicable attributes. This will be useful in developing implementation strategies because common attributes can be helpful in understanding why a group behaves in certain ways, or what factors might be relevant in changing their behaviors. As such these characteristics can be instrumental in shaping the way a target audience is approached. **Table 5.8** presents a number of potential characteristics that might be considered for various target audiences.

**Table 5.8: Examples of Potential Target Audience Characteristics**

Type of Characteristic
<p><b>Social and Demographic Characteristics</b></p> <ul style="list-style-type: none"> <li>• Population (by area, density, distribution, etc.)</li> <li>• Race/ethnicity</li> <li>• Language</li> <li>• Gender</li> <li>• Age (median, % seniors, % children, etc.)</li> <li>• Educational attainment (&lt;high school, high school, bachelor’s, graduate)</li> </ul>
<p><b>Economic Characteristics</b></p> <ul style="list-style-type: none"> <li>• Income (median, per capita, % below poverty level,</li> <li>• Employment (unemployment rate; job types, classifications, and responsibilities)</li> <li>• Communities of concern</li> <li>• Household income</li> <li>• Means of transportation</li> <li>• Income spent on transportation</li> </ul>
<p><b>Housing Characteristics</b></p> <ul style="list-style-type: none"> <li>• Housing (ownership rates, renters, etc.)</li> <li>• Homeless rate</li> <li>• % spending &gt; 30% of gross annual income on housing</li> </ul>
<p><b>Other Specific Characteristics (partial list for illustration)</b></p> <ul style="list-style-type: none"> <li>• Business practices</li> <li>• Pet ownership</li> <li>• Organization and club membership</li> <li>• Media and communication usage patterns (internet, television, etc.)</li> <li>• Other</li> </ul>

In general, a wide range of data and information are normally available. Where available, managers are encouraged to utilize standardized population and demographic data (e.g., through the U.S. Census Bureau, housing and transportation agencies, and associations of government). Standardized data and information on other characteristics such as those listed under item 4 may not be easily obtainable.



## Review Checklist



### Step 3-A Task 1

#### Evaluating Target Audiences

*Apply this task very broadly across all target audiences potentially associated with priority sources. The purpose is to provide a “snapshot” of what is currently known about these audiences.*

✓ **Compile existing data, information, and results applicable to known or potential target audiences. Consider the following questions:**

**Question 1: Which target audiences are associated with priority source contributions?**

**Question 2: What are the behavioral patterns of target audiences?**

**Question 3: How are behaviors changing over time?**

**Question 4: What are the characteristics of target audiences?**

✓ **Consolidate results into one or more summary lists of existing conditions. Categorize results as determined appropriate (by audience, behaviors, other characteristics, etc.).**

✓ **Compile supporting documentation for listed conditions.**

✓ **Select the audiences in the summary list(s) that will be further evaluated in Task 2. Consider “back-up” lists for future evaluation as necessary.**

✓ **Document the critical data and information gaps identified during Task 1 completion.**

**NOTES**

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

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**Figure 5.6: Review Checklist for Evaluating Target Audiences**

## Task 2 Defining Behavioral Problems

The objective of this task is to determine which of the behaviors identified above actually constitute problem conditions, i.e., they contribute to one or more priority source contributions. Two key questions guide the evaluation of behavioral problems.

 <b>Step 3-A Task 2 Key Questions</b> Defining Behavioral Problems		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Target Audience Behaviors and Characteristics</b>  	<b>Question 1:</b> Is the behavior causally linked to a known or suspected source contribution?  <b>Question 2:</b> Is there independent evidence for designating the behavior as a problem?	<b>Problem Behaviors</b>  

### **Question 1 Is the behavior causally linked to a known or suspected source contribution?**

When a source contribution is known or suspected, behavioral problems are implicated as potentially causing or contributing to it. PGAs are normally considered to represent problem conditions if their magnitude and prevalence is sufficient to cause a significant source loading. BMPs and supporting behaviors can also be considered problems if they are absent or existing levels of implementation are low. A critical consideration is the degree to which existing data and information support the establishment of linkages of either type of behavior to specific source contributions.

In some cases, the evidence can be direct and conclusive (e.g., runoff to the street can be observed to result from people overwatering their lawns). In other cases, linkages between behaviors and discharges are less conclusive. Where they're suspected, managers should focus on confirming or strengthening them over time. Those that can be confirmed may be implicated as significant problem conditions. In practice, the investigation of behaviors does not always result in evidence of causality, so other lines of evidence should be considered.

## **Question 2 Is there independent evidence for designating the behavior as a problem?**

Behaviors may sometimes also be classified as PGAs based solely on their general characteristics. This makes sense since a behavior that can be observed to mobilize or transport pollutants or flows will intuitively have some “pollution potential”. However, in many cases, observed problem behaviors will not result in higher outcome level problems. Common examples include the outdoor application of pesticides and fertilizers. Even though observations of runoff from residential yards may appear to implicate these substances as problematic, monitoring results may not show impacts to local water bodies. While this may suggest to some parties that the discharges are not problematic, other managers will look at this differently and conclude that any amount of runoff from these activities is contributing to a problem, measurable or not. A similar example would be the application of pesticides, which is also often concluded to be problematic even in the absence of measurable water quality impacts. Both examples underscore the importance of discretion in deciding which behaviors represent problem conditions.



## Review Checklist



### Step 3-A Task 2

#### Defining Behavioral Problems

*Apply this task individually to each behavior identified in Task 1 for further evaluation. The purpose of this task is to determine which of these behaviors should be designated as problems.*

✓ **For each identified condition, consider the following questions:**

**Question 1: Is the behavior causally linked to a known or suspected source contribution?**

**Question 2: Is there independent evidence for designating the behavior as a problem?**

✓ **Document known or suspected problem behaviors.**

✓ **Consolidate results into one or more summary lists. Categorize results as determined appropriate (by target audience, PGAs, BMPs, etc.).**

✓ **Compile supporting documentation for listed conditions.**

✓ **Document the critical data and information gaps identified during Task 2 completion.**

#### NOTES

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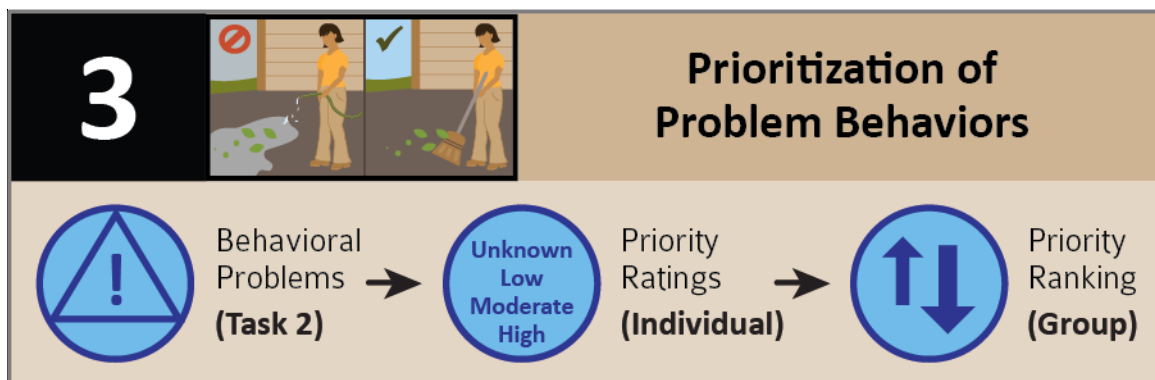
**Figure 5.7: Review Checklist for Defining Behavioral Problems**



## Task 3 Prioritizing Behavioral Problems




Given the wide range of problem behaviors likely to be identified for any specific target audience, prioritization will help to ensure that managers' efforts stay focused on those considered to be most important. In establishing priorities, a variety of potential factors will need to be considered. The key questions below will help to guide managers through a general prioritization process, but they may be fleshed out or modified as experience is gained and in response to individual circumstances. Note that this process follows the sustainability approach described in **Section 3.0**.

Prioritization follows a two-step process (**Figure 5.8**). Each problem is first reviewed to determine its priority rating. Ratings are then considered together to determine their relative priority ranking. Managers may already have other preferred approaches than those described, and should choose those that work best for them.



**Figure 5.8: General Process for Prioritizing Problem Behaviors**

The key questions below should be applied individually to each **Task 1** problem behavior identified in the order presented. They can also be applied to the prioritization of BMP alternatives within a defined PGA-BMP package. In either instance, this will result in priority designations for each problem behavior. Once these designations have been made individually, they can be considered together to determine which of them will be targeted for change in **Step 3-B**.

 <b>Step 3-A Task 3 Key Questions</b> Prioritizing Behavioral Problems		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Identified Problem Behaviors</b> 	<b>Question 1:</b> What is the priority rating of each behavior?  <b>Question 2:</b> What is the relative importance of each behavior?	<b>Priority Behavioral Problems</b> 

### Question 1 What is the individual priority rating of each behavior?

Establishment of priority ratings establishes values for the priority of each identified behavior. This is approached through the three review tiers introduced in **Section 3.3**. Given the qualitative nature of the exercise, ratings for all factors should generally be kept as simple as possible.

#### Tier 1 Regulatory Screening

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Tier 1 is a simple screening step. Most target audience behaviors aren't explicitly addressed in permits. However, if a behavior is legally required or prohibited (e.g., overwatering), or is otherwise meaningfully affected by legal or regulatory requirements, there may be little discretion in determining its priority.

#### Tier 2 Technical Review

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The priority rating of a behavior should reflect its significance, certainty, and controllability. **Significance** refers to the nature, magnitude, and prevalence of the behavior. Each of these attributes will already have been considered in Task 1, so this is primarily a review and consideration of those results. Ideally the litmus test for significance is an understanding of how and to what degree the behavior influences priority source contributions. In practice, it can be difficult to establish these linkages. In designating an overall value for significance, managers will need to decide how to weigh each of the three contributing criteria.

**Certainty** describes the confidence that managers have in their understanding of the existence and attributes of the behavior. Certainty will tend to be positively correlated with priority (i.e., the higher the certainty, the higher the priority). Behavioral assessments that are based on simple observations or anecdotal information are likely to



be somewhat uncertain. Like other outcomes, certainty increases with data support (e.g., through surveys) and statistical analysis.

**Controllability** is the potential for a program to control or modify the behavior. Low controllability behaviors do not tend to be priorities for resource commitments. In general, target audience behaviors are difficult to modify. Controllability is generally higher for highly regulated populations such as construction and development audiences, or for municipal staff. Commercial and industrial audiences can also be difficult to control where they are not subject to inspection and enforcement. Likewise, residential audiences, which are primarily addressed through education and incentive programs, can be the most difficult to control.

### Tier 3 Sustainability Review

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The Sustainability Review brings in two additional sets of considerations.

**Economic Impacts** are essential considerations because every problem and every proposed solution has one or more costs associated with it. The costs of continuing a PGA, and those of the BMPs that are potentially needed to reduce or eliminate it, can all be relevant. Costs may be borne by the target audience, the program, or other parties. At this point, considerations of program costs can often be premature since program implementation strategies may not have been developed.

Costs should consider more than just magnitude. Cost-effectiveness and return-on-investment (ROI) are also relevant. The most efficient or effective options may not be the least expensive ones.

**Social Impacts** are those related to the target audience, society at large, or other specific segments within it. Some behaviors may be determined to have social impacts that are publicly acceptable. Behavioral changes that are drastically different from the current social norm may be publicly criticized, rejected, and difficult for the municipality to bring about. For example, fireworks are displayed over a waterbody as part of an annual event. An option would be to prohibit the fireworks, but social considerations could make it very unpopular to do so. Without very strong evidence of the need for a ban, the leadership of the municipality may be very uncomfortable banning this activity.

Managers should also keep in mind that neither of these ratings reflects a particular direction of impact. Economic and social ratings can be either positive or negative. It's also quite possible that multiple economic or social factors will be identified. Because a

single rating is needed for each, managers will need to use discretion in evaluating the net impact of those factors.

### Assignment of Priority Ratings

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Considering each of factors described above, an **individual priority rating** should be assigned to each behavior. As described in **Section 3.3**, the particular methodologies used to weigh contributing criteria are left to the discretion of managers. However, complex weighting schemes are generally discouraged because of the qualitative nature of the exercise. Each of these ratings is assigned individually, and has nothing to do with the respective priorities of other behaviors.

**Table 5.9** illustrates several examples of how priority ratings might be assigned to individual behaviors. While a specific set of rating values is utilized for illustration, managers should feel comfortable substituting any designations they consider appropriate (0-1-2-3, A-B-C-D, etc.).

These examples assume an equal weighting of each of the contributing factors in each part, but the actual weighting should be determined by the manager conducting the exercise. It's possible to prioritize behaviors using quantitative scoring methods. But in most cases, qualitative ratings are appropriate and reasonable.

These examples are purely qualitative in that each of the individual designations is more or less lined up, with an overall priority rating being estimated by "eyeballing" the collective weight of the results. It should be emphasized that each example lends itself to differing interpretations. The best results are likely to be obtained when all available data are considered, and when managers have a high degree of familiarity with each of the individual scoring factors. Prioritization processes are always subjective and managers should avoid the use of schemes that assume a level of precision that is unwarranted or that are too literal in the interpretation of results.

**Table 5.9: Examples<sup>4</sup> of the Assignment of Priority Ratings to Behavioral Conditions (PGAs)**

Problem Behaviors	Tier 1: Regulatory Screening	Tier 2: Technical Rating				Tier 3: Sustainability Ratings			Overall Priority Rating
		<i>Significance</i>	<i>Certainty</i>	<i>Controllability</i>	<u>Overall</u>	<i>Economic Factors</i>	<i>Social Factors</i>	<u>Overall</u>	
Overwatering of residential lawns	<b>Unknown</b>	High	Moderate	Moderate	<b>High</b>	Moderate	High	<b>Mod-High</b>	<b>High-Mod</b>
Sidewalk rinsing	<b>Unknown</b>	Insignificant	Uncertain	Low	<b>Low</b>	Low	Moderate	<b>Low-Mod</b>	<b>Moderate</b>
Floor, mat, and surface cleaning	<b>Unknown</b>	Low	Low	Low	<b>Low</b>	Unknown	Moderate	<b>Moderate</b>	<b>Low</b>
Pesticide application	<b>Low</b>	Mod	Low	Low	<b>Low</b>	High	Low	<b>High</b>	<b>Low</b>

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<sup>4</sup> These examples are hypothetical and for illustration only. They are not intended to imply a particular priority for any of the behaviors listed.

## Question 2 What is the relative importance of each behavior?

Problem behaviors must now be evaluated together to determine their relative importance. As this stage, a variety of potential behavioral priorities are likely to be generated. In determining their relative importance, two types of scenarios may be considered. Although many-to-one relationships between source contributions and behaviors are normally expected, these can take different forms. It will often be the case that multiple behaviors (either PGAs or BMPs) contribute to an identified source contribution. However, a single behavior (e.g., overwatering) can also contribute to multiple source contributions (e.g., discharges of flow from several outfalls). Both types of scenarios are important, and the approaches described here can be applied to either.

The final output of **Task 3** will be a ranked list of priority behaviors corresponding to priority source contributions. Problem behaviors can either be put into a ranked order or be grouped by their priority ratings. Establishing ranked orders consists of lining up the behaviors under consideration from highest priority to lowest, with the higher priorities normally constituting the greater management priorities. As illustrated in **Figure 5.7**, behavioral problems will sometimes have “tie scores”. Rather than further differentiating between them, grouped rankings may be considered. Depending on the degree of information available, “sub-rankings might also be developed within each group. As previously emphasized, this is a qualitative exercise, and rating and ranking systems cannot replace the role of judgment in evaluating results.

↑ Increasing Priority ↑	RANKED ORDER EXAMPLE	GROUPED RANKING EXAMPLE
	<ol style="list-style-type: none"> <li>1. Overwatering of residential lawns</li> <li>2. Sidewalk rinsing</li> <li>3. Floor, mat, and surface cleaning</li> <li>4. Pesticide application</li> </ol>	<p><b>GROUP A (High-Moderate)</b></p> <ul style="list-style-type: none"> <li>• Overwatering of residential lawns</li> </ul> <p><b>GROUP B (Moderate)</b></p> <ul style="list-style-type: none"> <li>• Sidewalk rinsing</li> </ul> <p><b>GROUP C (Low)</b></p> <ul style="list-style-type: none"> <li>• Floor, mat, and surface cleaning</li> <li>• Pesticide application</li> </ul>

**Figure 5.9: Potential Options for Ranking Problem Behaviors**

**Figure 5.10** provides a Review Checklist to guide Task 3 completion. Significant data and information gaps are likely to be associated with behavioral outcomes. It’s important to document and consider them in the development of future data collection strategies.



## Review Checklist



### Step 3-A Task 3

#### Prioritizing Behavioral Problems

Apply this task individually to all problem conditions identified in Task 2. Its purpose is to assess and rank the priorities of problem conditions.

✓ For each identified behavioral problem, consider the following questions:

#### Question 1: What is the priority rating of each problem behavior?

**Tier 1: Regulatory Screening**      **REGULATORY RATING** \_\_\_\_\_

- ✓ Identify regulatory requirements and constraints affecting priority.
- ✓ Based on their collective impact, assign a Tier 1 rating.
- ✓ Note the overall direction of influence of the rating (requirement or constraint).
- ✓ Should an Overall Priority Rating be assigned based solely on regulatory criteria? If yes, stop and document. If no, continue to Tier 2 Review.

**Tier 2: Technical Review**      **TECHNICAL RATING** \_\_\_\_\_

- ✓ Evaluate the significance, certainty, and controllability of the behavior. Establish individual weightings as appropriate for each of the three factors.
- ✓ Based on review of the above factors, assign a Tier 2 Rating.
- ✓ Should the problem be eliminated from further consideration or assigned a “low” Overall Priority Rating based solely on technical criteria? If yes, stop and document. If no, continue to Tier 3 Review.

**Tier 3: Sustainability Review**      **SUSTAINABILITY RATING(S)** \_\_\_\_\_

- ✓ Identify economic factors and social factors affecting the behavior.
- ✓ Assign a Tier 3 Rating for economic and social factors individually or collectively.

**Overall Priority Rating**      **OVERALL PRIORITY RATING** \_\_\_\_\_

Collectively consider Regulatory, Technical, and Sustainability results to assign an Overall Priority Rating for each behavior. Assign individual weightings for each of the factors considered. Economic and Social factors may be counted individually or together.

#### Question 2: What is the relative importance of each receiving water problem?

**Rank individual priority ratings for further consideration in Step B.**

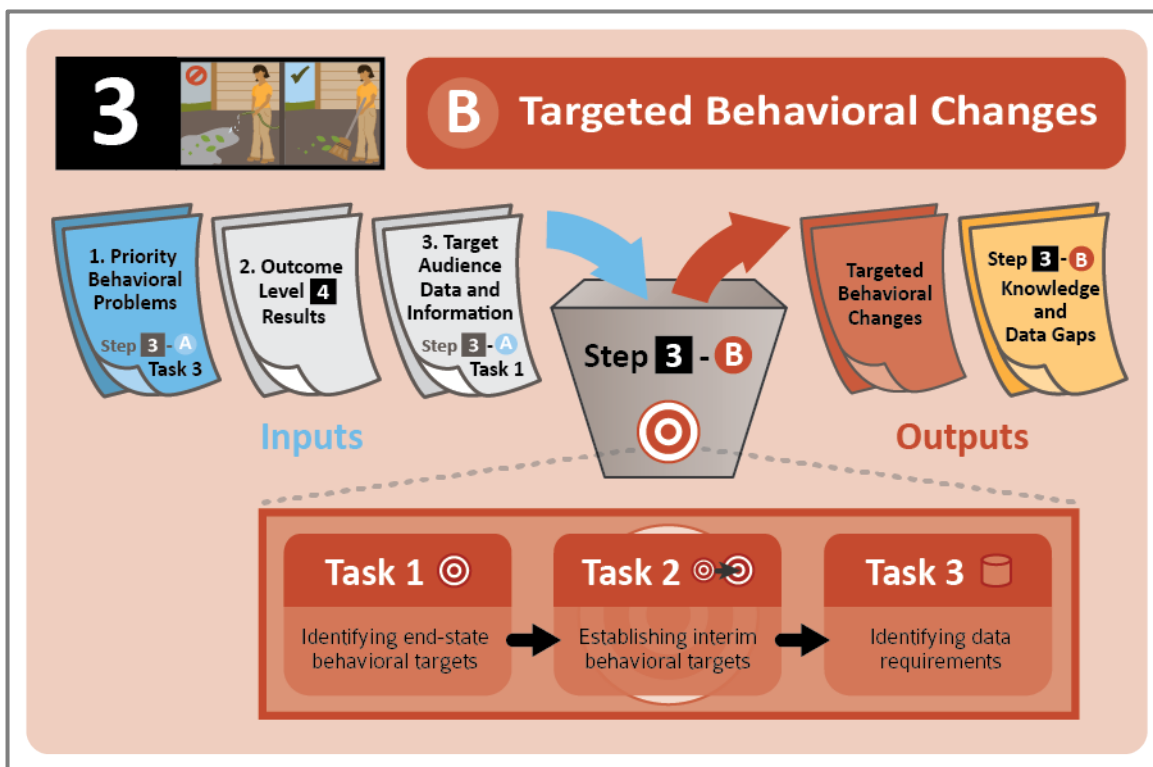
✓ Document the critical data and information gaps identified during Task 3 completion.

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**Figure 5.10: Review Checklist for Prioritizing Behavioral Problems**

## Step 3 - B Targeted Behavioral Changes

Step 3-B addresses the establishment of measurable targets for behavioral change. Targets for change should be considered at least for the highest priority behaviors identified above. As shown in **Figure 5.11**, targeting consists of three tasks.






**Figure 5.11: Targeted Behavioral Changes (Step 3-B)**

The identification of specific targets for behavioral change that will constitute success is a critical step in the development of management strategies. Interim targets will also help to define an incremental pathway toward the achievement of longer-range goals. Once a pathway for achieving changes is projected, the metrics and methods needed to document and support their evaluation can be established.

Three sets of inputs should be considered. The starting point will be the list of **Priority Behavioral Problems** identified in **Step 3-A Task 3**. For each identified priority, one or more specific targets for change should be considered. Outcome Level 4 Results will be reviewed, in particular, priority pollutant and flow contributions. Finally, managers should review all applicable **Target Audience Data and Information** gathered in **Step 3-A Task 1**.

## Task 1 Identifying end-state behavioral targets

This step identifies approaches to establishing end-state behavioral targets. Two key questions are used to guide this process.

 <b>Step 3-B Task 1 Key Questions</b> Identifying End-state Behavioral Targets		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Priority Behavioral Problems</b> 	<b>Question 1:</b> What is the end-state for the behavior?  <b>Question 2:</b> When will end-state behaviors be achieved?	<b>End-state Behavioral Targets</b> 

### **Question 1 What is the end-state for each targeted behavior?**

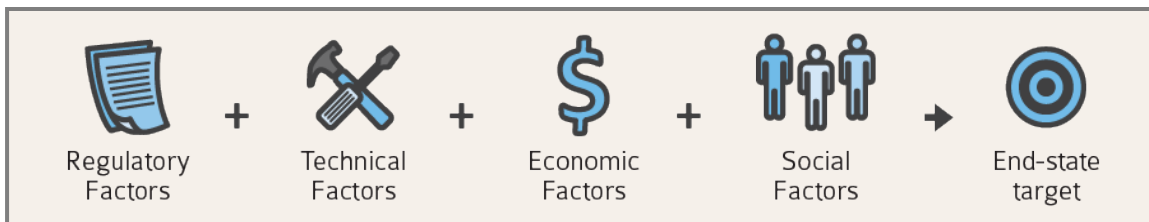
The selection of behaviors for targeting should initially include all of the PGAs and BMPs in each identified PGA-BMP package; PGAs will be targeted for reductions and BMPs for increases. Targeting should consider the relative impact of each behavior on desired source reductions and the potential of achieving desired changes. At this point, some behaviors may be determined to be lower priorities than initially thought.

Determining how much change is needed is one of the most challenging parts of the targeting process since multiple behaviors tend to act on the same source contributions, and the respective influence of each is not usually well-known. Conceptually, there are a few obvious starting points. The first of these is the total elimination of a PGA. Targeting to eliminate a PGA is tempting because it provides a clear endpoint. However, while conceptually simple, elimination of PGAs is not usually realistic. It generally makes more sense to establish realistic measurable targets that can be evaluated and modified over time.

The establishment of targets should consider the review factors and general conceptual approaches described below.

### **Review Factors**

As shown in **Figure 5.12**, the same general factors introduced above during problem prioritization are applicable to the establishment of behavioral targets.



**Figure 5.12: Factors Relevant to Setting Targets for MS4 Changes**

“Draft” targets can initially be established through a consideration of the regulatory and technical factors introduced above in Task 3-A-3, and those results further reviewed and refined as necessary in the context of sustainability considerations. This process may need to be repeated multiple times as additional data and information become available.

In determining the magnitude of targeted changes, the following options should be considered.

### **General Approaches to Establishing End-state Behavioral Targets**

Approaches to targeting may include any of the following, individually or in combination.



#### **Setting Targets to Comply with Regulatory Requirements**

Setting targets to regulatory requirements, particularly those established in permits, should always be considered up front. Most permits do not set explicit requirements for behavioral change in target audiences, but these should be adhered to if applicable.



#### **Setting Targets to Achieve Specific Level 4 Changes**

This should be the preferred approach when measurable targets have been defined for the higher outcome level changes, and their relationship to the behavior is known. Since the magnitude of source reductions is assumed to be a function of the magnitude of behavioral changes, an increase or decrease in one should cause a corresponding change in the other. Ideally both endpoints are known and quantifiable. Where they are not, relationships between them can still be explored "experimentally" as described below.



#### **Setting Targets to Resource Availability**

Resource availability must often be considered because programs don't always have the staffing, budget, or other resources needed to pursue behavioral targets established through other approaches. Resource availability presents real world



constraints that must be considered, although it's also important to remember that targets which are too low may not be effective. Rather than under-targeting because of resource limitations, it may make more sense to defer targeting some behavioral changes until additional resources can be obtained, or to divert those existing resources to other priority behaviors.



### **Setting Targets to Learn and Adapt**

This approach involves establishing targets to explore the potential for affecting behavioral changes. Because these conditions are sequentially linked both to level 4 and 2 conditions, managers can also benefit from exploring relationships to these higher and lower level outcomes.

One way of approaching this is through the establishment of **stretch targets**. For example, if 50% of a target audience currently implements a behavior, 60% could be targeted over a defined period. Existing facilitation activities could then be “dialed up” and results periodically evaluated to see if behavioral changes are resulting. An advantage to stretch targeting is that it allows efficiencies to be evaluated as activities are incrementally increased. **Experimental targets** are similar to stretch targets, but are instead intended to explore and test assumptions or hypotheses about relationships between target audience behaviors and other outcomes. In the absence of specific information on the relationship of facilitation activities to behavioral change, managers will often need to take a trial-and-error approach. Specific levels of implementation can be targeted and tracked along with ongoing assessment of source load reductions. By exploring potential causal relationships, managers can set a course for “managing to learn”.




## **Question 2 When will end-state behaviors be achieved?**

Depending on the types of changes that are targeted, significant periods of time may be needed. In instances where programs exert a high degree of direct control (e.g., through building or grading permits), changes can occur very quickly, but in most instances managers should realistically expect that multiple years, and in some cases decades, may be needed.



## **Task 2 Establishing interim behavioral targets**

This step identifies approaches to establishing the interim targets to assist in evaluating progress towards achieving end-state behavioral targets. Two key questions are used to guide this process.

 <b>Step 3-B Task 2 Key Questions</b> Establishing Interim Behavioral Targets		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>End-state Behavioral Targets</b> 	<b>Question 1:</b> What interim targets are needed to evaluate progress toward the end-state behavior?  <b>Question 2:</b> When will interim targets be achieved?	<b>Interim Targets</b> 

### **Question 1 What interim targets are needed to evaluate progress toward the end-state behavior?**

Change is not linear, so managers should be realistic about how quickly they can expect behaviors to change. Consider a population of industrial operators with 65% overall compliance rate (e.g., no BMP violations observed during 65% of inspections). If a 5-year goal of bringing this rate to 90% is established, managers wouldn't expect 1/5th of the goal to be achieved each year. Realistically, allowances need to be made for the time it takes to "ramp up," refine, and fully implement a program. Likewise, there will be a point at which maximum gains should be expected, and possibly diminishing returns beyond after that. Interim targets establish milestones along the way necessary to realistically anticipate critical events in the implementation curve, and to make adjustments in response to results. They allow progress to be measured and strategies to be adjusted along the way. They're critical to adaptive management.

### **Question 2 When will interim targets be achieved?**

Timeframes for interim targets should reflect the initial schedule set for achieving the end-state condition, the need for specific feedback along the way, and the ability to measure change over interim periods. Interim targets should not be set so aggressively that it will be difficult to obtain useful feedback.



## **Task 3 Identifying data requirements**

Now that targets for behavioral change have been identified, it's necessary to identify how they will be measured, what data are needed to allow measurement, and how these data will be collected and analyzed. Planning is not complete unless managers are fully

prepared to obtain and evaluate the data needed to assess each targeted change. Each of the questions below should be addressed for every targeted outcome addressed in Step 3-B.

**Question 1 What metrics will be used?**

Behavioral changes should be expressed in unambiguous terms. This should include a specific formulation of the outcome statement, the assignment of units of measure or assessment, and units of time. **Section 7.3** provides additional detail on the establishment of metrics.

**Question 2 What data collection methods will be used?**

It's also essential that managers identify how data will be collected for each targeted receiving water outcome so that it can be tracked and assessed. **Section 7.4** provides additional detail on potential data collections options.

**Question 3 What data analysis methods will be used?**

The last consideration for any targeted behavioral change is how the data will be evaluated. The choice of analytical method can dictate what specific metrics should be used, how the data should be collected, and the quality of the result. **Section 7.5** provides additional discussion of data analysis options.

Where the establishment of data requirements for behavioral change cannot be satisfactorily addressed up front (e.g., there's no available option for collecting the desired data), this may need to be documented as a knowledge and data gap (**Step 6-C**).

**Figure 5.13** provides a Review Checklist to guide Step 3-B completion.



## Review Checklist



### Step 3-B Tasks 1, 2, and 3 Targeted Behavioral Changes

Apply this task individually to all problem behaviors identified in Task 2. Its purpose is to identify specific targets for behavioral change.

✓ **End-state Targets (Task 1)**  
Consider the following questions:

Question 1: What is the end-state for the behavior?

Question 2: When should the end-state condition be achieved?

✓ **Interim Targets (Task 2)**  
Consider the following questions:

Question 1: What interim targets are needed to evaluate progress toward the end-state behavior?

Question 2: When will interim targets be achieved?

✓ **Data Requirements (Task 3)**  
Consider the following questions:

Question 1: What metrics will be used?

Question 2: What data collection methods will be used?

Question 3: What data analysis methods will be used?

✓ For each priority behavioral problem, document interim and end-state targets, and the data requirements necessary to track and evaluate them.

✓ Compile one or more lists of targeted behavioral changes and supporting documentation for listed conditions.

✓ If a priority behavioral change is not or cannot be targeted, document the reason.

✓ Document all Step B data and information gaps.

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**Figure 5.13: Review Checklist for Targeting Behavioral Changes**



## Step 3 - C

### Documenting Knowledge and Data Gaps

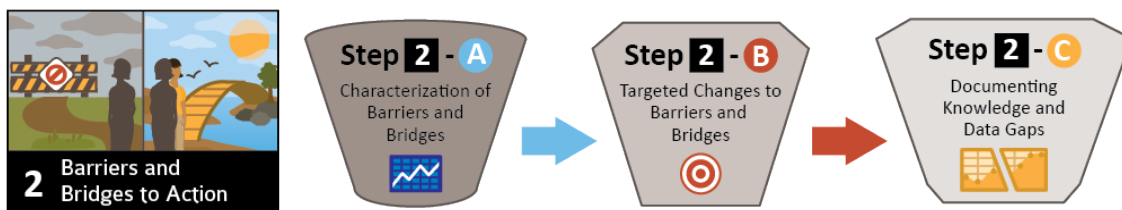
The identification of knowledge and data gaps should be ongoing throughout the entire Level 3 planning process. At its conclusion, managers should have developed a list of gaps that can be incorporated into a Monitoring and Assessment Strategy. **Section 7.0** provides additional guidance on assessment tools and strategies to support the development of these strategies. Because an existing baseline of data and information does not exist for many target audience attributes, Level 3 knowledge and data gaps are likely to be significant. Critical gaps must be addressed to ensure that they are resolved over time. **Table 5.10** provides examples of general areas of inquiry where Level 3 knowledge and data gaps are likely to be encountered. These are intended to provide a framework for identifying actual knowledge and data gaps, which will be much more specific than those listed here.

**Table 5.10: Potential Areas of Behavioral Knowledge and Data Gaps**

- ✓ Understanding of behavioral patterns (nature, magnitude, prevalence, distribution, variability, and trends)
- ✓ Availability and adequacy of behavioral data
- ✓ Knowledge of how regulatory requirements and constraints affect behavior
- ✓ Knowledge of how economic factors affect behavior
- ✓ Knowledge of how social factors affect behavior
- ✓ Methodologies, criteria, and data support for conducting problem identification
- ✓ Methodologies, criteria, and data support for prioritization

### 5.3 Outcome Level 2: Barriers and Bridges to Action

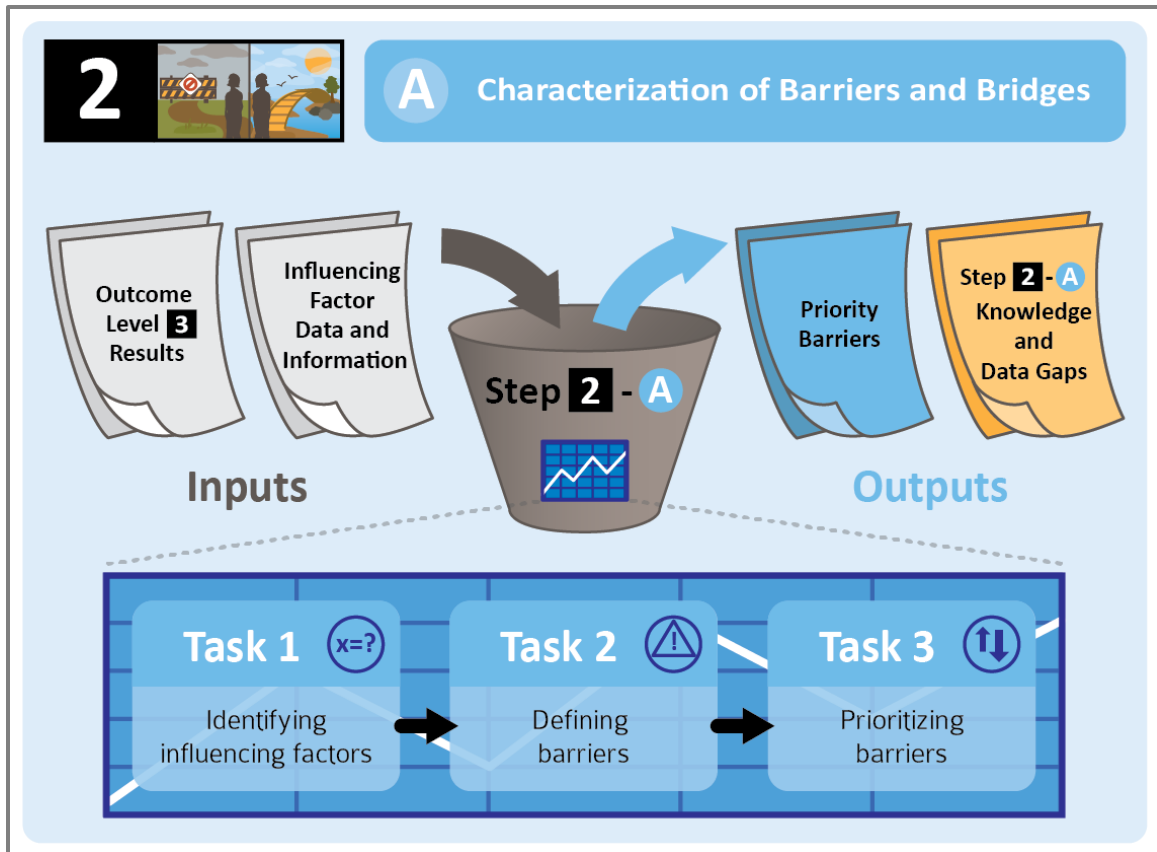
A number of behaviors associated with priority target audiences have now been identified, and targets set for the changes to be pursued in them. Targeted behavioral changes were established within the context of the **PGA-BMP packages** identified in Level 3 above. The purpose of Level 2 planning is to identify the factors that influence these behaviors now, or that will influence the changes that will be sought in them. This will later serve as a basis for the development of strategies to motivate, empower, or compel target audiences to reduce or eliminate the use of PGAs and increase the use of BMPs. As shown here, Level 2 planning is a three-step process.



In **Step 2-A** managers will identify, explore, and prioritize, the factors influencing priority target audience behaviors. This will initially include looking at a wide range of potential **influencing factors**, but an important focus of this step will be to determine how each of these might represent “**barriers**” or “**bridges**” to practices that are protective of water quality. **Step 2-B** will focus on targeting changes in influencing factors that favor the implementation of BMPs over PGAs. Finally, **Step 3-C** will look at the knowledge and data gaps discovered along the way, so that future data collection initiatives can be directed toward resolving them.

#### **Step 2 - A** Characterization of Barriers and Bridges

A number of factors can affect managers’ ability to achieve desired behavioral outcomes. As shown in **Figure 5.14**, their characterization entails three distinct tasks. Influencing factors are initially considered broadly with an eye toward understanding their general characteristics. The focus is then narrowed to factors representing problem conditions, i.e., favoring the implementation of PGAs over BMPs. Prioritization allows managers to focus on those barriers that will be targeted in the development of implementation strategies.



**Figure 5.14: Characterization of Barriers (Step 2-A)**

**Table 5.11** identifies a number of typical data and information inputs that may be useful in Level 2 strategic planning. Level 3 planning results should always be a first consideration since information already obtained on target audiences can be particularly useful. For example, demographics and other target audience characteristics might help to identify influences unique to specific populations. Likewise, socioeconomic data, possibly in combination with BMP implementation costs, could assist in identifying potential economic barriers. Many other sources of data and information can also be relevant. Most programs have been collecting data such as inspection results, surveys and tests, and hotline inquiries for years or decades. To varying degrees, all of these sources are potentially relevant.

**Table 5.11: Potential Inputs for Level 2 Planning**

**A. Level 3 Results (from Section 5.2)**

- Priority target audiences (residents, employees, contractors, etc.)
- Priority behaviors (BMPs, PGAs, supporting behaviors, etc.)
- Target audience characteristics (population, socioeconomic, housing, etc.)
- BMP implementation costs
- Knowledge and data gaps

**B. Other Miscellaneous Data and Information Sources (examples only)**

- Existing programs (annual reports, electronic and hard copy records and documentation, etc.)
- Interviews, surveys, tests, and quizzes
- Facility or site inspections
- Complaint investigations
- Pollution reports and referrals (hotline, employee, contractor, etc.)
- Third party data (submission of compliance data, monitoring data, maintenance records, etc.)
- Population, demographic data, etc. (census bureau, associations of governments, etc.)
- Special investigations (community-based social marketing studies, etc.)
- Research, literature, and technical reports (CASQA BMP Manuals, surveys, etc.)
- Other (TBD as needed)






## **Task 1 Identifying Influencing Factors**

In Task 1 managers will consider a range of factors with the potential for influencing any of the behaviors in the priority **PGA-BMP packages** identified during Level 3 planning<sup>5</sup>. At this point all potential influences should be of interest. Available data and information will initially be reviewed to address the two key questions below for each behavior under consideration. This can initially seem somewhat daunting, but it should be emphasized that the process does not have to be repeated in its entirety for every identified influencing factor since they will often be similar or the same for multiple target audience behaviors.

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<sup>5</sup> Supporting behaviors can also be addressed as part of this task, but are not discussed further here because the primary focus of this section is on the PGAs and BMPs associated with primary target audiences.



 <b>Step 2-A Task 1 Key Questions</b> <b>Identifying Influencing Factors</b>		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Available Data, Information, and Results</b>  	<b>Question 1:</b> What factors influence priority target audience behaviors?  <b>Question 2:</b> How are influencing factors changing over time?	<b>Identification of Influencing Factors</b>  

### Question 1 What factors influence priority target audience behaviors?

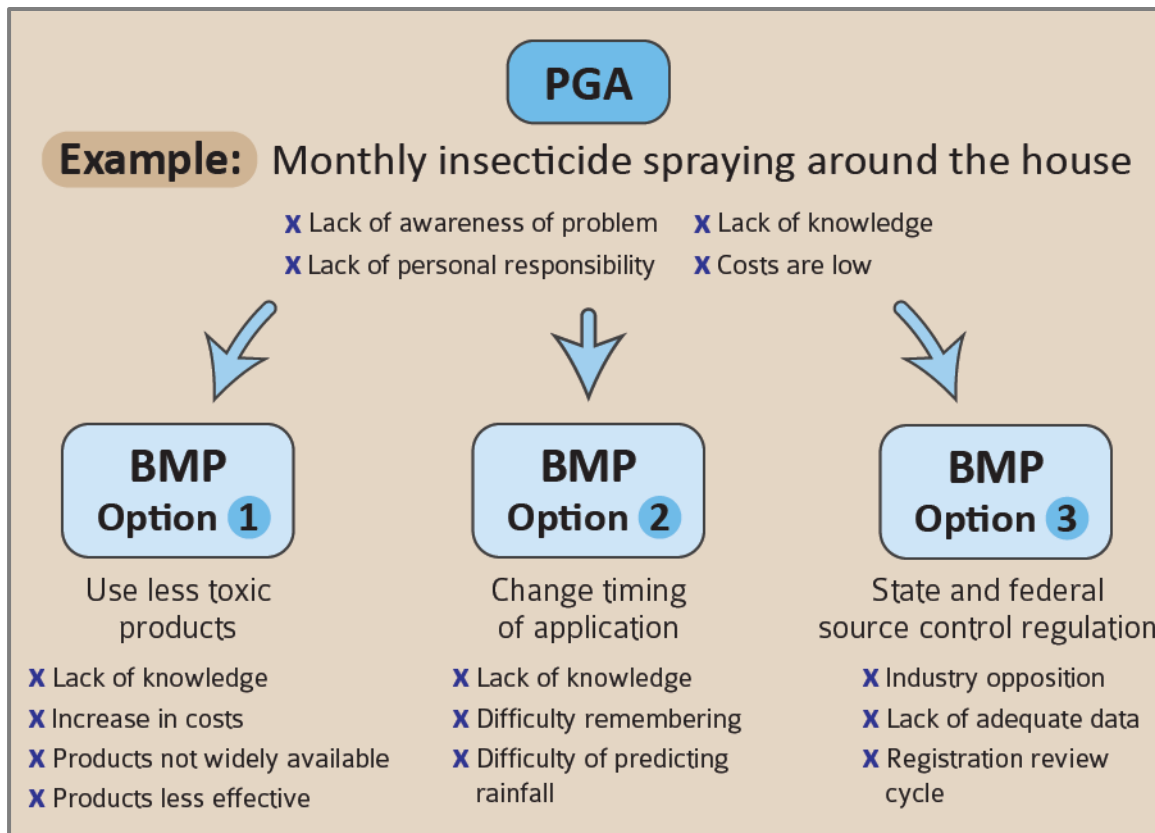
An **influencing factor** is anything that affects the behaviors of an individual or group. Many types of factors can influence the PGAs<sup>6</sup> and BMPs constituting the priority PGA-BMP packages introduced above. To illustrate, **Figure 5.15** shows a hypothetical example with monthly insecticide spraying around the home as the PGA and three potential BMP options. As shown, a number of factors can influence any of the behaviors, and some of these can apply across more than one of the behaviors.

These factors and the parameters that shape them are explored below. This will help managers to validate the behavioral priorities initially established in Level 3 planning, and to set the stage for later targeting solutions.

Managers will sometimes already know what the factors influencing a behavior of interest are. This process is not intended to supplant existing knowledge or judgment. Its purpose is to provide a means of thoroughly and systematically exploring a range of typical influencing factors. Managers should use whatever approaches work best for them.

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<sup>6</sup> Multiple PGAs are possible, but it's expected that most PGA-BMP packages will most commonly consist of a single PGA and one or more BMP alternatives.



**Figure 5.15: Example of Influencing Factors Associated with a PGA-BMP Package**

### Types of Influencing Factors

Influencing factors can be either of two general types, personal or external. **Personal factors** are attributes of individuals within a defined population. Their importance lies in the fact that there is always an element of personal choice in engaging in any behavior. Personal factors directly influence people’s motivation or ability to act. Although a definitive list of personal factors does not exist, a few should be standard considerations for any priority behavior under review.

- **Knowledge** refers to the accuracy of beliefs held by individuals regarding a reasonably well-established fact. For example, one-half of a residential target audience understands that storm drains and sanitary sewers are different. Depending on the objective, knowledge can be general as in this example, or very specific to a particular set of issues or practices (e.g., construction site BMPs, maintenance responsibilities for treatment control BMPs, or dog walking).
- **Awareness** is the recognition that something exists (a problem, an alternative, etc.). For example, are people aware that a local water body is polluted? Do they know that

their own actions might contribute to this problem? Without such awareness, it may be difficult to obtain their support, to increase their levels of knowledge, or to involve them in potential solutions. Awareness is fundamentally different than knowledge in that being aware of something does not imply any particular knowledge or understanding of it. Typical areas of awareness of interest to managers include:

- Awareness of water pollution impacts
  - Awareness of the causes of water pollution
  - Awareness of potential alternatives or solutions
  - Awareness of stormwater programs and available resources
- **Attitudes** are favorable or unfavorable evaluations. They reflect the beliefs, feelings, values, and dispositions of individuals, and affect their willingness to engage in targeted behaviors. Regardless of how aware or knowledgeable a target audience is, they are unlikely to change behaviors if their attitudes toward water quality protection are unfavorable. For example, if residents feel that a vigorous tomato garden is more important than the condition of a nearby creek, or that BMPs represent unnecessary government intrusion, program implementation strategies will likely need to go beyond providing them informational brochures.
  - **Other personal factors** such as emotional responses, habits, levels of commitment, or inability to remember information or change habits can also play a role in how changes are affected in individuals. With experience, managers are likely to identify many such attributes.

**Table 5.12** provides examples of personal factors as they apply to a variety of different behaviors. In practice, distinctions between knowledge and awareness are sometimes likely to become blurred. In this respect, thoroughness is much more important than classification. Ultimately it matters less that a factor is correctly classified than it does that it is identified.

**Table 5.12: Examples of Personal Factors that Can Affect Behaviors**

	<b>Pesticide Use</b>	<b>Vehicle Washing</b>	<b>Disposal of Reusables</b>	<b>Sediment Discharge</b>
<b>Knowledge</b>	Proper methods of pesticide application	Controllable spray nozzles can significantly reduce runoff	Compost piles should be turned at least weekly	Silt fences should not be used at the base of a slope
<b>Awareness</b>	My pesticides can harm aquatic life	Commercial car washes minimize runoff	Training on composting is locally available	Discharges can be reported to a local hotline
<b>Attitudes</b>	Healthy plants are more important than environmental protection	People have a right to wash their cars on the street	Composting is too messy to bother with	Construction will be completed long before anyone notices our runoff

It's often assumed that increases in knowledge or awareness are sufficient to bring about changes in behavior. While it's generally true that both are necessary components of behavioral change strategies, it's also true that they cannot bring about such changes alone. Cost increases are an obvious example of an influence that can easily undermine increases in knowledge or awareness. In this respect, the external factors described below should also be given consideration. Despite the obvious temptation, managers should be wary of implementation strategies that rely exclusively on increasing knowledge or awareness to bring about change.

**External factors** also influence behavior, but are not within the ability of an individual to directly control. Examples include costs of compliance, the convenience of an activity, or peer pressure. It's not possible to describe all of the external factors that might apply to a target audience behavior, but the categories below should provide a fairly thorough starting point. Managers are encouraged to use them as a general guide, but should add other categories or factors as needed. **Table 5.12** provides examples of external factors as they apply to a variety of different behaviors.

- **Regulatory factors** -- People are bound by laws, regulations, and ordinances, which in many cases provide clear directives on what they can, can't, or must do. For example, some pesticides can be legally obtained and applied only by licensed pest control

applicators, while others are available without restriction to homeowners. In this case, patterns of usage will clearly be influenced by existing regulations. Examples of other regulatory factors that can shape target audience behavior include building codes and zoning restrictions.

- **Economic factors** – Most practices or controls have costs associated with them. When given a choice, people will generally pick alternatives that are inexpensive, especially in the short-term. In many cases, PGAs exist because they represent a low cost alternative. It may be difficult to move a target audience toward an environmentally preferable alternative if it is viewed as too expensive (or difficult or time consuming). In such cases, costs may need to be reduced, financial incentives provided, or other strategies (e.g., stronger regulatory directives) put in place to offset the impact of costs. In addition, short-term costs of alternatives may be acceptable to some audiences, if there are demonstrable long-term savings, and especially if coupled with increased effectiveness.
- **Technological factors** – Technology is a cornerstone of effective stormwater management. As a wider variety of products and technologies is made available, residents and businesses are provided with an increasing array of BMP options. For example, porous pavement, a type of asphalt or concrete pavement that allows water to drain through, is now being increasingly used in a variety of applications. Another example is storm drain inserts, which continue to improve in efficiency and cost-effectiveness. In many cases, environmentally preferable technologies exist, but there may not be a willingness to try them until they are less expensive, more readily available, or better established as industry norms. It should also be noted that the influence of technology is less important for the many practices that rely primarily on simple choices (sweeping rather than hosing, using doggy bags to pick up after pets, etc.).
- **Structural factors** – Structural factors refer to adequacy of systems, sites, or structures to support a particular behavior or set of practices. For example, topography or space limitations might inhibit the use of treatment controls on a new development site, or present safety concerns during maintenance. While structural factors can sometimes be limiting, they can also present opportunities. For instance, a community garden might provide residents access to composting bins that they could otherwise not afford or don't have the space for.

- **Organizational factors** – At work and in their personal lives, most people are part of one or more organizations (companies, agencies, homeowners associations, industry associations, etc.). Within an organization, individuals can be influenced by a variety of factors such as leadership, individual or group roles and responsibilities, expectations and accountability, information dissemination, resource commitments, and opportunities for involvement or providing input.
- **Societal factors** – Societal factors are similar to organizational factors, but generally apply at a broader level. People live in and identify with others in their communities, cities, and states. Likewise, many of them also strongly identify with specific cultural or ethnic backgrounds or groups. People are generally most influenced by the groups they identify most strongly with. As such, peer pressure and social and cultural norms can be very powerful influences on behavior. In some cases, these factors can be used to overcome long standing habits and to increase commitment to a BMP alternative. For example, recycling is now a well-established practice in most communities, and it's much less common to see someone throw a recycle into a trash container than it was twenty years ago.
- **Communication factors** – In today's world, people receive more information in more different ways than they ever have. Despite this, information on stormwater management practices constitutes a very small portion of their daily information dosage. As already noted, people are unlikely to engage in behaviors they are not aware of or knowledgeable about. Communication is therefore critical to establishing behavioral norms at homes, businesses, and elsewhere. If residents lack information on pesticide alternatives they won't try them. Or if a business fails to communicate its recycling and reuse policy to employees they can't be expected to follow it. Conversely if people receive messages that support the use of existing PGAs (e.g., advertisements that show people mowing luxuriant lawns or washing cars in their driveways), they are more likely to continue them.

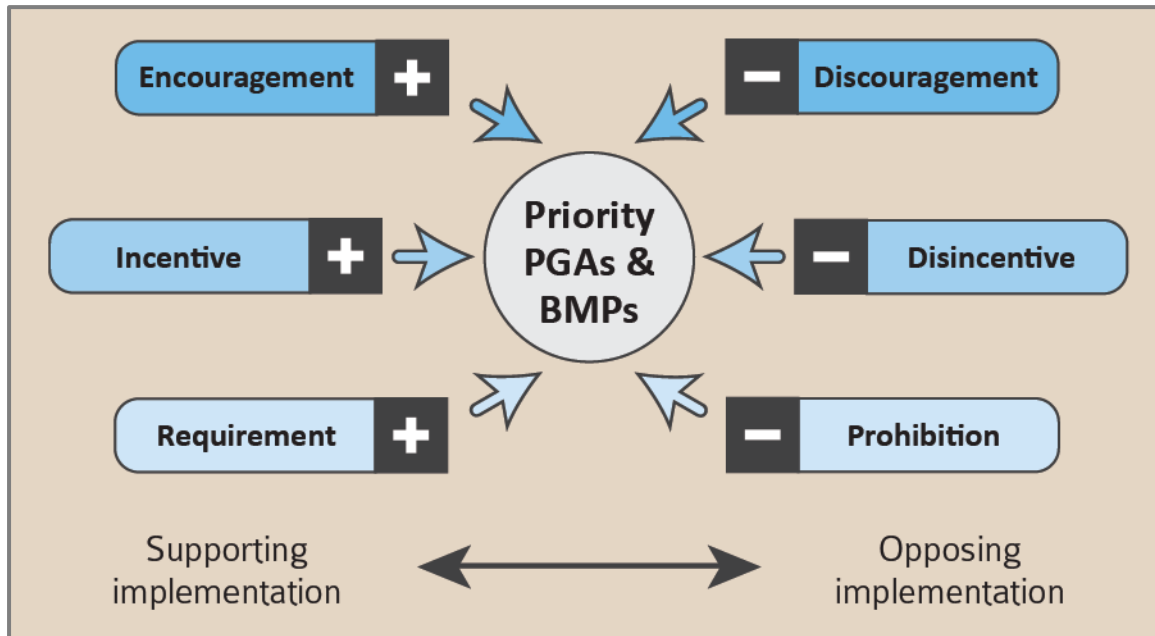
**Table 5.13: Examples of How External Factors Can Influence Behavior**

	<b>Pesticide Use</b>	<b>Vehicle Washing</b>	<b>Disposal of Reusables</b>	<b>Sediment Discharges</b>
<b>Regulatory factors</b>	Some pesticides can be applied only by licensed pest control applicators; others are freely available	A program prohibits discharges from businesses, but not at residences	Re-use of materials is encouraged rather than legally required	Ordinances prohibit discharges, but do not require prevention through erosion control practices
<b>Economic factors</b>	Many pesticides are inexpensive or cheaper in large quantities	Washing in a driveway is cheaper than using a car wash	Changes in practices may require upfront investments (e.g., composting bins)	Materials needed for stabilization projects can be expensive
<b>Technological factors</b>	Effective alternatives may not be available, or may require additional labor and training	Controllable spray nozzles are widely available	Technologies are not widely available for recycling of "higher numbered" materials	A variety of products are available for effectively managing discharges
<b>Structural factors</b>	Site safety issues limit the use of pesticide alternatives	A nearby parking lot with a pervious surface could facilitate environmentally friendly car washing	A community garden provides residents access to composting bins	Site topography or space limitations inhibit the use of sediment control practices
<b>Organizational factors</b>	A business lacks a policy or procedures on pesticide use	A company has an offsite vehicle washing policy	Employees are encouraged to recycle and reuse	Site maintenance is not an organizational priority
<b>Societal factors</b>	Green lawns are perceived by a community to be linked to pesticide application	Washing soapy water onto streets is considered "low class"	Composting is valued by the community	Sediment discharges onto public streets are considered unsightly
<b>Communication factors</b>	Residents lack information on pesticide alternatives	Information on "dry washing" techniques is widely available	Recycling and reuse policy is not communicated to employees	Information on effective erosion control practices is not widely available

## Nature and Magnitude

Influencing factors can act on behaviors in a limited number of ways. Two aspects are essential, nature and magnitude.

In general, the **nature** of an influencing factor is either to support or inhibit a behavior. As shown in **Figure 5.16**, there are six general ways that a factor can potentially influence a behavior.



**Figure 5.16: Different Ways that a Factor Can Influence Behaviors**

This figure represents a continuum of possible forms of influence. In cases where a factor supports, or will later be targeted to support, a behavior, it will correspond to one of the three methods to the left of center on the figure. Likewise, the three methods to the right of center would generally be considered to work against the implementation of a behavior. As shown, each of these three pairs of opposites is fundamentally different in the way that it influences. In concept, the requirement and prohibition of practices (BMPs and PGAs, respectively) represent the strongest or most absolute type of influence, but this is not always so in practice. Consider, for example, legal requirements that are ignored or unenforced. Incentives and disincentives occupy a middle ground. Examples of factors that can act as incentives or disincentives to maintain or discontinue a behavior include peer pressure from social groups or within organizations, or an offset to a high BMP cost through a rebate. Encouragement and discouragement often align with educational approaches, and may sometimes appear to be the weakest of the forms shown. However,



this isn't necessarily so. When sufficiently resourced or combined with other factors, changes in knowledge and awareness can have important impacts on existing or targeted behaviors.

As implied, the **magnitude** of the influence exerted is also important. In most cases, multiple factors are likely to be working together to influence a particular behavior, so it's necessary to understand the relative "push or pull" of each.

Assignments of magnitude are necessarily subjective, and it would clearly not be possible to establish a common quantifiable metric across all influence types (knowledge, regulatory, etc.). The objective here is not pinpoint accuracy. General approximations of magnitude are more than adequate for helping managers to understand which factors are driving each PGA or BMP, and how they work together to do so.

Once both nature and magnitude are characterized, they can be considered together to provide a basic description of the condition. The following illustrates four possible ways of describing "encouragement" influences:

- |   |   |
|---|---|
| <input type="checkbox"/> No influence       | <input type="checkbox"/> Moderate encouragement |
| <input type="checkbox"/> Weak encouragement | <input type="checkbox"/> Strong encouragement   |

This scheme can be applied in exactly the same way to the other five types of influence.

At this point, the task of managers is simply to characterize how and to what degree influencing factors might be exerting control over a behavior. This will be especially important during Level 1 planning as implementation strategies are developed to break down PGAs and replace them with BMPs.

## Variability

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Nature and magnitude can say a lot about an influencing factor, but are not always good predictors of the effect it will have. Whenever possible, its **variability** should also be considered. Some influencing factors might reasonably be expected to vary according to predictable cycles (e.g., seasonally or during business hours), and others might be temporary or unsustainable. For example, legal restrictions on water use might be instituted seasonally or only during severe drought conditions. Likewise, levels of knowledge in a target audience could peak during a school semester, immediately after a training session, or during a media campaign. Influencing factors can also vary spatially. For example, knowledge or awareness of a pollution impact might be very different in

distinct communities (based on educational levels, patterns of program implementation, etc.).

One important aspect of variability is the **prevalence** of a barrier or bridge. For example, a strict ordinance provision (i.e., a "strong prohibition") might be viewed as an effective means of increasing water conservation. While true in concept, it might not be so if people are unaware of it or ignore it. Likewise, effective BMP technologies may exist for a particular application (i.e., a "strong encouragement"), but not be prevalent because of high costs or limited distribution.

## **Certainty**

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**Certainty** refers to the degree of confidence that managers have in the existence or attributes of an influencing factor. Managers will want to avoid expending significant program resources in addressing a factor that is not well-established or well-understood. For example, knowledge of a BMP alternative might be assumed to be lacking in a target audience, but without survey data or some other form of confirmation results might be uncertain. This might present a risk of needlessly investing in education when other influencing factors are more important.

Significant data and information gaps are very likely to be encountered during the evaluation of influencing factors. It's very likely that managers will need to speculate or hypothesize on the potential roles of influencing factors during this process. This is highly encouraged given the need to fully explore the range of potential factors acting on any behavior. It's important, though, to continue working toward eventual confirmation of factors that are initially not well understood.

## **Controllability**

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**Controllability** refers to the potential for a program to modify an identified influencing factor. A factor that does not have a reasonable chance of being successfully controlled may ultimately not be a likely priority for resource commitments. For example, regulatory barriers (e.g., seasonal restrictions on channel cleaning), or economic factors such as the costs of BMPs, can sometimes be beyond the ability of a local program to control.

### **Question 2 How are influencing factors changing over time?**

A final consideration in evaluating influencing factors is their temporal change. Like other outcome types, influencing factors can often be expected to change over time.

Understanding these changes can have important explanatory benefits for similar changes observed or predicted in PGAs or BMPs.

Managers should be interested in knowing whether an influencing factor is **trending** upward or downward over time. As an example, the costs of a control measure are decreasing over time as technological improvements are made or markets evolve to satisfy a demand. Or communication within a company is increasing along with organizational commitment to sustainable practices.

Changes in influencing factors due to program implementation can often be expected, or may have already occurred, as a result of implementing programs that act on them. For example, changes in awareness as a result of ongoing media campaigns are well documented for many programs. Likewise, more businesses maintain stormwater pollution plans onsite and conduct routine employee training than in the past. Whether or not these are sustainable trends is another question, but program implementation undeniably plays an important role in shaping changes in many influencing factors.

### **Direction of Influence -- Barriers versus Bridges**

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Any of the factors identified above can influence behavior in either of two ways. Factors that influence "negatively" (i.e., favoring the implementation of PGAs, or inhibiting the implementation of BMPs or other targeted behaviors) are considered **Barriers**. A typical barrier for many target audiences is a lack of knowledge. Consider, for example, a situation where residents are unaware that spraying pesticides before it rains is harmful, or that less toxic alternatives are available. Without this knowledge, they may be unlikely to engage in practices that are protective of water quality. The designation of barriers is explored further in **Task 2** (Identifying Barriers).

Factors that influence "positively" (i.e., promoting the implementation of BMPs or reducing the impact of PGAs) are considered **Bridges**. A bridge either modifies or offsets a barrier. Using the same example, a higher level of awareness in residents regarding pesticide practices and impacts could be considered a bridge toward the implementation of preferable behaviors. Likewise, if cost or convenience had instead been the identified as barriers, potential bridges might have included the establishment of economic incentives or increases in the availability of alternative products. Bridges represent potential solutions. In most cases, they reflect potential rather than actual conditions. Bridges are considered further in **Step 2-B**.

At this stage, a number of critical parameters have been identified for use in completing a **Task 1** characterization of potential influencing factors. **Figure 5.17** below provides a **Review Checklist** to help guide managers through these reviews. The final output of Task 1 will be a listing of, and corresponding documentation for, all of the factors potentially influencing each of the priority PGA-BMP packages identified during Level 3 planning.



## Review Checklist



### Step 2-A Task 1

#### Identifying Influencing Factors

Apply this task very broadly across Outcome Level 2 sources of data and information. The purpose is to provide a “snapshot” of what is currently known about influencing factors.

- ✓ **Compile existing influencing factor data, information, and results.**  
Consider the following questions:

**Question 1: What factors influence priority target audience behaviors?**

**Question 2: How are influencing factors changing over time?**

- ✓ **Consolidate results into one or more summary lists of existing conditions. Categorize results as determined appropriate (by factor type, etc.).**

- ✓ **Compile supporting documentation for listed factors.**

- ✓ **Select the influencing factors in the summary list(s) that will be further evaluated as potential problems in Task 2. Consider “back-up” lists for future evaluation as necessary.**

- ✓ **Document the critical data and information gaps identified during Task 1 completion.**

#### NOTES

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**Figure 5.17: Review Checklist for Evaluating Influencing Factors**

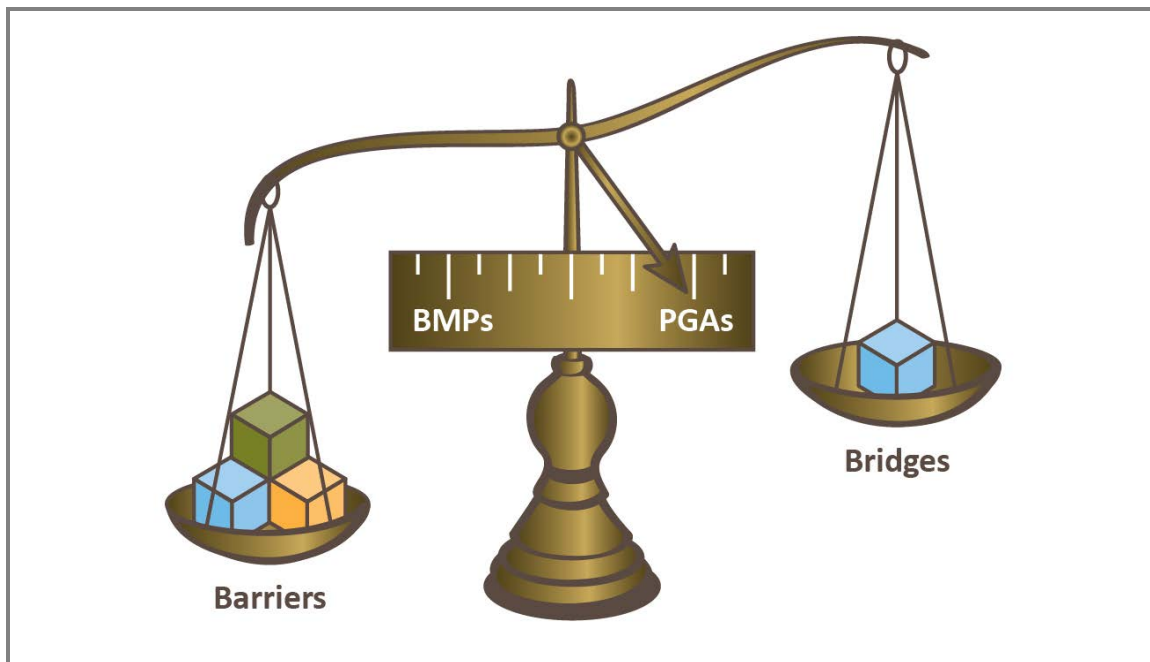


## Task 2 Defining Barriers

In **Task 1**, managers explored the range of factors influencing the behaviors in a **PGA-BMP package**. **Task 2** completion will focus on identifying which of these factors are acting as barriers, i.e., contributing to behavioral problems. These barriers will be prioritized in **Task 3** and later considered in the development of management strategies.




Source contributions are presumed to result when the net influence of all factors acting on a package favors the implementation of PGAs over BMP alternatives. A useful analogy is to envision barriers and bridges as weights loaded onto the opposite pans of the balancing scale shown in **Figure 5.18**.

When the weight of the barriers on the left exceeds that of the bridges on the right, the dial will move in the direction of PGAs, a condition that should in turn cause source contributions. If this "negative balance" is shifted in the other direction, the result should be a reduction in PGAs or an increase in BMPs with a resultant decrease in source contributions. Managers will want to design and implement strategies that affect a shift toward this "positive balance" – either by removing barriers or by adding bridges.



**Figure 5.18: A Balance of Barriers and Bridges that Favors PGA Implementation**

In setting out to achieve a positive balance, managers need to know how and why the current negative balance exists. To do so, they will further evaluate each of the **Influencing Factors List** identified in **Task 1**, using two key questions to guide this review.

 <b>Step 2-A Task 2 Key Questions</b> Defining Barriers		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Identified Influencing Factors</b> 	<b>Question 1:</b> Which influencing factors are barriers?  <b>Question 2:</b> What is the collective influence of identified barriers?	<b>Problem Factors (Barriers)</b> 

### Question 1 Which influencing factors are barriers?

Influencing factors that favor the implementation of PGAs, or that inhibit the implementation of BMPs or other targeted behaviors, are barriers. Three general types of barriers are described below. These three types will form the basis for a corresponding classification of bridges later discussed under **Task 3**.

#### Barriers that Support PGAs

Type 1 Barriers consist exclusively of influencing factors that favor PGAs. **Table 5.14** provides examples of Type 1 Barriers contributing to pesticide over-application. Whether considered individually or together, each factor contributes in some way toward the continued existence of the PGA. PGA-supporting factors are the most common types of barriers for the obvious reason that existing source contributions are caused by PGAs.

**Table 5.14: Examples of Factors that Support PGAs**

Type of Factor	Example of Barrier
Knowledge	A lack of knowledge that pesticides should be applied according to label instructions results in residents assuming that "more is better";
Cost	The pesticide is inexpensive or cheaper in large quantities; or
Attitudes	Residents place a high value on insect-free vegetables and believe that insecticides are necessary to achieve them.

In some cases, an influencing factor can also act as a barrier because of its impact on one or more BMPs. Two types of influencing factors that act on BMPs are considered below. It should be emphasized that the net influence of these factors is identical to that of a PGA-supporting factor in that all contribute to source loadings. But the distinction between them is critical because managers will have to decide whether their implementation strategies will focus on the PGA, the BMP, or both.

### Barriers that Inhibit BMPs

Type 2 barriers are those that inhibit the implementation of BMPs. They can do so in either of two ways.

#### a. Insufficient support for existing BMPs

In this case, a factor that could support BMP implementation is either too weak or not prevalent enough to do so. Because these factors have the potential to influence positively, they can also be described as "weak bridges." Considering pesticide application again, **Table 5.15** provides examples of these barriers.

**Table 5.15: Examples of Factors that Provide Weak Support for Existing BMPs**

Type of Factor	Example of Barrier
<b>Knowledge</b>	Some knowledge of proper techniques for applying pesticides exists, but it is very limited.
<b>Organizational</b>	A business has strict policies on pesticide application, but employees are unaware of it.
<b>Regulatory</b>	Legal restrictions on pesticide application exist, but are largely ignored.



The common element in each example is the limited existence of a factor that has the potential for positive influence. In spite of this potential, each factor is currently acting as a barrier because its overall influence is too limited to provide a bridge. In cases like this, BMPs that might otherwise offset PGA contributions instead represent “lost opportunities”.

**b. Inhibition of BMP alternatives**

These barriers act on identified BMP alternatives. An essential component of the PGA-BMP Packages developed in Level 3 planning is the establishment of these alternatives. These barriers are those that inhibit their implementation. **Table 5.16** provides examples associated with a less toxic pest control product identified as an alternative to pesticide application.

**Table 5.16: Examples of Factors that Inhibit BMP Alternatives**

Type of Factor	Example of Barrier
<b>Awareness</b>	People are unaware that the alternative product exists.
<b>Technology</b>	The alternative product is less effective than the pesticide.
<b>Cost</b>	The cost of the alternative product is high.
<b>Attitude</b>	People perceive that the product is unsafe, complicated, or ineffective.

BMP alternatives are the core of effective management strategies, so it’s important to understand which influencing factors will either support or inhibit their implementation. Without this knowledge, managers risk committing to misdirected or ineffective implementation strategies.

**Question 2 What is the collective influence of identified barriers?**

Once barriers are identified, it’s important to further consider how they impact each of the priority behaviors in the PGA-BMP package. Two issues are critical. First, it’s useful to consider how individual barriers are (or are not) related to each other. This is accomplished by placing them in groupings under each priority behavior. It’s possible that some barriers will act on multiple behaviors (e.g., two separate BMP alternatives). In such case, they should be listed as many times as applicable.

**Figure 5.19** provides a very simple illustration of how barriers can be grouped. Starting with the complete list of barriers on the left, each individual barrier is placed under one or more of the priority behaviors. This allows managers to view the applicable barriers as a discrete package, and to associate each barrier with only those others that it is related to.



**Figure 5.19: Grouping of Barriers by Priority Behavior**

It's also important to understand the nature of each barrier's impact within its respective grouping. While all barriers theoretically contribute to their respective behaviors, each influences in different ways and degrees. In some cases it may be obvious which factors have the greatest influence on a behavior. In cases where more information is needed, surveys, focus groups or target audience interviews provide insights regarding personal factors that will influence behavior. A review of existing regulations, costs of PGAs and BMPs, and other observations of existing conditions should be helpful for identifying significant external factors that may be causally linked to a behavior.

In Task 1, a range of attributes were identified for each influencing factor. Reviewing these results together provides a general indication of the potential influence of each identified barrier. **Table 5.17** provides an example of how attribute information for various barriers can be summarized. This is essentially a review of what is known so far, and preparation for prioritization (**Task 3**).

**Table 5.17: Summarizing Attributes of Barriers by Priority Behavior<sup>7</sup>**

Barrier	Description	Nature and Magnitude	Prevalence	Certainty	Controllability
<b>PGA: Over-application of fertilizers</b>					
Barrier 5	Lack of awareness of impacts	Weak encouragement	High	Uncertain	Moderate
Barrier 6	Low cost of fertilizers	Moderate encouragement	Moderate	Low	Low
Barrier 1	Community values green lawns	Moderate requirement	Unknown	Moderate	Unknown
<b>Existing BMP: Change timing of applications</b>					
Barrier 1	Inconvenience of BMP	Moderate discouragement	Unknown	Moderate	Low
Barrier 2	Low awareness of BMP	Strong discouragement	Unknown	Moderate	Moderate
<b>BMP Alternative: Use smaller amounts or alternative formulations</b>					
Barrier 3	Higher cost	Weak encouragement	High	High	Not controllable
Barrier 4	Perceived ineffectiveness	Strong discouragement	Moderate	High	Low
Barrier 1	Lack of awareness of alternative	Moderate incentive	Unknown	Moderate	Moderate

<sup>7</sup> These examples are hypothetical and for illustration only. They are not intended to imply the existence of any particular attributes for any of the barriers listed.

The importance of understanding relationships between barriers and behaviors cannot be overstated. However, it can be challenging to do so with confidence because neither tends to be easily observable. Moreover, even when the existence of a potential influencing factor can be verified, it may still not be possible to establish a linkage to a PGA or BMP. In most instances, some degree of speculation is needed, and managers will need to rely heavily on judgment and experience. Those that are willing to speculate on the causes of problem behaviors and to implement and evaluate potential solutions should become increasingly confident in their assessment of barriers over time.

It's recommended that managers utilize the **Task 2 Review Checklist** provided below (**Figure 5.20**) in evaluating barriers. This will ensure that reviews are comprehensive and that all obvious bases are covered. Over time, the Review Checklist can be modified to reflect individual experience. In some cases, working assumptions about barriers will be guided by available data and information (survey results, economic data, etc.). In others, a lack of data availability may force managers to substitute their own best professional judgment in establishing working assumptions about barriers. In either case, best professional judgment should always be part of the equation. Wherever possible, working assumptions should be verified up front to reduce uncertainty during subsequent implementation and assessment phases. However, this isn't always realistic, so managers will often need to make the best guesses they can, and then implement and assess. This trial-and-error approach provides an important alternative for real world application.



## Review Checklist



### Step 2-A Task 2 Defining Barriers

Apply this task individually to each Task 1 influencing factor selected for further evaluation. The purpose of this task is to determine which of these should be designated as problems.

✓ **For each identified influencing factor, consider the following questions:**

**Question 1: Which influencing factors are barriers?**

**Question 2: What is the collective influence of identified barriers?**

✓ **Document known or suspected barriers.**

✓ **Consolidate results into one or more summary lists. Categorize results as determined appropriate (by behavior, barrier type, etc.).**

✓ **Compile supporting documentation for listed barriers.**

✓ **Document the critical data and information gaps identified during Task 2 completion.**

#### NOTES

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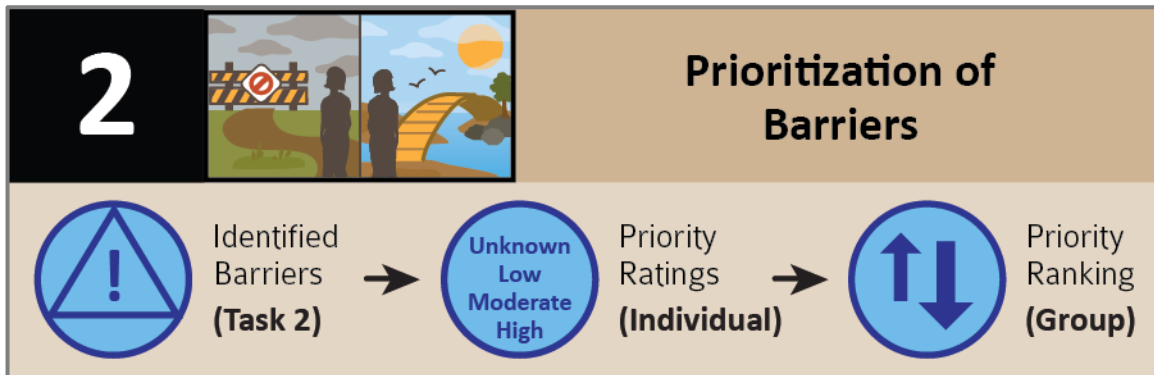
**Figure 5.20: Review Checklist for Defining Barriers**

## Task 3 Prioritizing Barriers

Once the barriers influencing a PGA-BMP package are identified, a priority rating can be established for each of them. This consists of setting a value for the priority of each barrier (e.g., high, medium, or low). In itself, this implies little for the establishment of management priorities because not all priority barriers can be targeted for change. Ratings should also be compared to each other to assign relative rankings. Prioritization is guided by the key questions below.

 <b>Step 2-A Task 3 Key Questions</b> Prioritizing Barriers		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Identified Barriers</b> 	<b>Question 1:</b> What is the individual priority rating of each barrier?  <b>Question 2:</b> What is the relative importance of each barrier?	<b>Priority Barriers</b> 

Prioritization follows a two-step process (**Figure 5.21**). Each problem is first reviewed to determine its priority rating. Ratings are then considered together to determine their relative priority ranking. Managers may already have other preferred approaches than those described, and should choose those that work best for them.



**Figure 5.21: General Process for Prioritizing Problem Behaviors**

## Question 1 What is the individual priority rating of each barrier?

Establishment of priority ratings establishes a value for the priority of each identified barrier. This is approached through a combination of the first two review tiers introduced in **Section 3.2**<sup>8</sup> that emphasizes both the relative influence of each factor and its potential for influence by stormwater programs. As previously described for other Levels, simple rating schemes are recommended for all review factors.

### Tier 1 Regulatory Screening

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Tier 1 is a simple screening step. If a barrier to change is legally required or prohibited (e.g., zoning that prohibits certain activities or features), or is otherwise meaningfully affected by legal or regulatory requirements, it may be difficult or impossible to modify. If so, managers will need to decide if it makes sense to further consider the barrier as a potential priority. It's also important to determine if regulatory requirements conflict with other prioritizing considerations. To overcome conflicting barriers, they may need to work with the regulatory authority on modifying the regulation or identifying alternative approaches.

### Tier 2 Technical Review

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For the most part, the priority rating will reflect a combination of its significance, certainty, and controllability. **Significance** refers to the nature, magnitude, and variability of a barrier. Each of these attributes will already have been considered in Task 1, so this is primarily a review and consideration of those results. Ideally the litmus test for significance is a clear understanding of how and to what degree the removal of a barrier would make a measurable reduction in a PGA. In practice, this is usually not the case since quantifiable linkages between barriers and behaviors have usually not been established. Over time, as barriers and behavioral outcomes become increasingly well-quantified, it may be more realistic to pursue these relationships. Certainly managers should look to quantifiable linkages as an ideal, but this shouldn't stop them from aggressively hypothesizing and exploring linkages, either qualitatively or quantitatively.

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<sup>8</sup> The third tier (Sustainability Review) is not included for Level 2 prioritization because economic and social considerations are "built into" the initial identification of influencing factors. As such, they are already reflected.

In designating an overall value for significance, managers will need to decide how to weigh each of the three contributing criteria. Magnitude and prevalence will usually be the most straightforward to interpret because they more easily lend themselves to some form of quantification. As discussed previously, barriers can have many different natures (encouragement, prohibition, incentives, etc.), and the potential of each to positively or negatively influence a behavior can be quite different. This is not to say that nature is less important, but interpretation may require greater discretion.

**Certainty** describes the confidence that managers have in their understanding of a barrier. Because they want to avoid committing resources toward addressing a factor that is not well-established, certainty will tend to be positively correlated with priority (i.e., the higher the certainty, the higher the priority).

**Controllability** is the potential for a program to control or modify an identified barrier. Low controllability factors may also not be priorities for potential resource commitments. Controllability should also correlate positively with priority.

### Assignment of Priority Ratings

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Utilizing each of factors described above, an **individual priority rating** should be assigned to each barrier (**Table 5.18**). The particular methodologies used to weigh contributing criteria are left to the discretion of managers. However, complex weighting schemes are generally discouraged because of the qualitative nature of the exercise.

At this point, ratings are assigned individually, and have nothing to do with the respective priorities of other barriers. An example of potential ratings is as follows, but managers should feel comfortable substituting any designations they consider appropriate (0-1-2-3, A-B-C-D, etc.).

Unknown priority

Moderate priority

Low priority

High priority

**Table 5.18** illustrates several examples of the assignment of priority ratings to barriers and potential BMP alternatives initially identified in **Table 5.17**. In each instance, assignments are purely qualitative in that the individual designations for each rating factor are more or less lined up, with an overall priority rating being estimated by “eyeballing” the collective weight of the results. This emphasizes the subjective nature of scoring processes. Managers should avoid being too literal in the interpretation of results.



**Table 5.18: Examples of Rating Assignments for Individual Barriers<sup>9</sup>**

Barriers and BMP Alternatives	Tier 1: Regulatory Screening	Tier 2: Technical Rating				Overall Priority Rating
		<i>Significance</i>	<i>Certainty</i>	<i>Controllability</i>	<i>Overall</i>	
<b>PGA: Over-application of fertilizers</b>						
Lack of awareness of impacts	<b>Weak</b>	Moderate	Unknown	Moderate	<b>Moderate</b>	<b>Moderate</b>
Low cost of fertilizers	<b>Unknown</b>	Moderate	Low	Low	<b>Low</b>	<b>Low</b>
Community values green lawns	<b>Unknown</b>	Moderate	Moderate	Unknown	<b>Moderate</b>	<b>Low-Mod</b>
<b>Existing BMP: Change timing of applications</b>						
Inconvenience of BMP	<b>Weak</b>	Moderate	Unknown	Moderate	<b>Low</b>	<b>Low-Mod</b>
Low awareness of BMP	<b>Weak</b>	Moderate	Unknown	Moderate	<b>Low</b>	<b>Low-Mod</b>
<b>BMP Alternative: Use smaller amounts or alternative formulations</b>						
Higher cost	<b>Unknown</b>	Moderate	High	High	<b>Moderate</b>	<b>Mod-High</b>
Perceived ineffectiveness	<b>Weak</b>	Moderate	Moderate	High	<b>Moderate</b>	<b>Mod-High</b>
Lack of awareness of alternative	<b>Weak</b>	Moderate	Unknown	Moderate	<b>Unknown</b>	<b>Mod-High</b>

<sup>9</sup> These examples are hypothetical and for illustration only. They are not intended to imply a particular priority for any of the influencing factors listed.

These examples assume an equal weighting for each contributing factor, but the actual weighting would be determined by the manager conducting the exercise. It's also possible to assign continuously distributed values (1.2, 3.7, etc.) to individual rating factors and to the ratings themselves, but this implies a level of precision that may not exist. In most cases, qualitative ratings are appropriate and reasonable for prioritizing barriers.

## Question 2 How are barriers ranked?

Question 1 dealt with rating barriers individually, but for these ratings to be useful in supporting decision-making, they must be evaluated together to determine their *relative* importance. Identified barriers can either be put into a rank order or be grouped by priority. **Figure 5.22** illustrates each approach.

Increasing Priority ↑	RANKED ORDER EXAMPLE		GROUPED RANKING EXAMPLE	
	Supporting PGAs	Inhibiting BMP Alternatives	Supporting PGAs	Inhibiting BMP Alternatives
	Barrier 3		<b>Group A Barriers</b>	<b>Group A Alternatives</b>
	Barrier 1	Barrier 7	3, 1, 2	7
	Barrier 2	Barrier 6	<b>Group B Barriers</b>	<b>Group B Alternatives</b>
	Barrier 5	Barrier 4	5	6, 4

**Figure 5.22: Examples of Ranked Order and Group Ranking of Priority Barriers**

Establishing ranked orders is a fairly straightforward process. For each behavior associated with a given PGA or BMP, the applicable barriers are lined up from highest priority to lowest, with the higher priorities constituting the greater management priorities. The downside to ranked order approaches is that barriers will tend to lump together because of “tie scores”. In such cases, managers may want to instead consider grouped rankings.

The simplest way to approach grouped rankings is again to look at all of the barriers associated with a given PGA or BMP. For each behavior, the highest priorities for management action will be the barriers in the highest priority groupings (in this case,

Group A). Looking instead at the PGA-BMP package as a whole, it's also possible to group barriers across multiple behaviors. There is an inherent logic to this in cases where some barriers act on multiple behaviors. This is really a judgment call, but managers should be aware of the additional complexity that may be entailed in doing so.

The final output of **Task 3** will be a ranked list of priority barriers influencing each identified barrier or PGA-BMP package. **Figure 5.23** below provides a **Review Checklist** to help guide both phases of this prioritization process. As in previous steps, significant data and information gaps are likely to be encountered along the way. It's critical to document these deficiencies and consider them in the development of future data collection strategies.



## Review Checklist



### Step 2-A Task 3 Prioritizing Barriers

Apply this task individually to all problem conditions identified in Task 2. Its purpose is to assess and rank the priorities of identified barriers.

✓ For each identified barrier, consider the following questions:

#### Question 1: What is the individual priority rating of each barrier?

Tier 1: Regulatory Screening    **REGULATORY RATING** \_\_\_\_\_

- ✓ Identify regulatory requirements and constraints affecting the barrier.
- ✓ Based on their collective impact, assign a Tier 1 rating.
- ✓ Note the overall direction of influence of the rating (requirement or constraint).
- ✓ Should an Overall Priority Rating be assigned based solely on regulatory criteria? If yes, stop and document. If no, continue to Tier 2 Review.

Tier 2: Technical Review    **TECHNICAL RATING** \_\_\_\_\_

- ✓ Evaluate the significance, certainty, and controllability of the barrier. Establish individual weightings as appropriate for each of the three factors.
- ✓ Based on review of the above factors, assign a Tier 2 Rating.
- ✓ Should the problem be eliminated from further consideration or assigned a “low” Overall Priority Rating based solely on technical criteria? If yes, stop and document. If no, continue to Tier 3 Review.

Tier 3: Sustainability Review    **SUSTAINABILITY RATING(S)** \_\_\_\_\_

- ✓ Identify economic factors and social factors affecting priority.
- ✓ Assign a Tier 3 Rating (or Ratings) either collectively for economic and social factors, or for each individually.

Overall Priority Rating    **OVERALL PRIORITY RATING** \_\_\_\_\_

- ✓ Collectively consider Regulatory, Technical, and Sustainability results to assign an Overall Priority Rating for the barrier. Assign individual weightings for each of the factors considered. Economic and Social factors may be counted individually or together.

#### Question 2: How are barriers ranked?

Rank individual priority ratings for further consideration in Step B.

✓ Document the critical data and information gaps identified during Task 3 completion.

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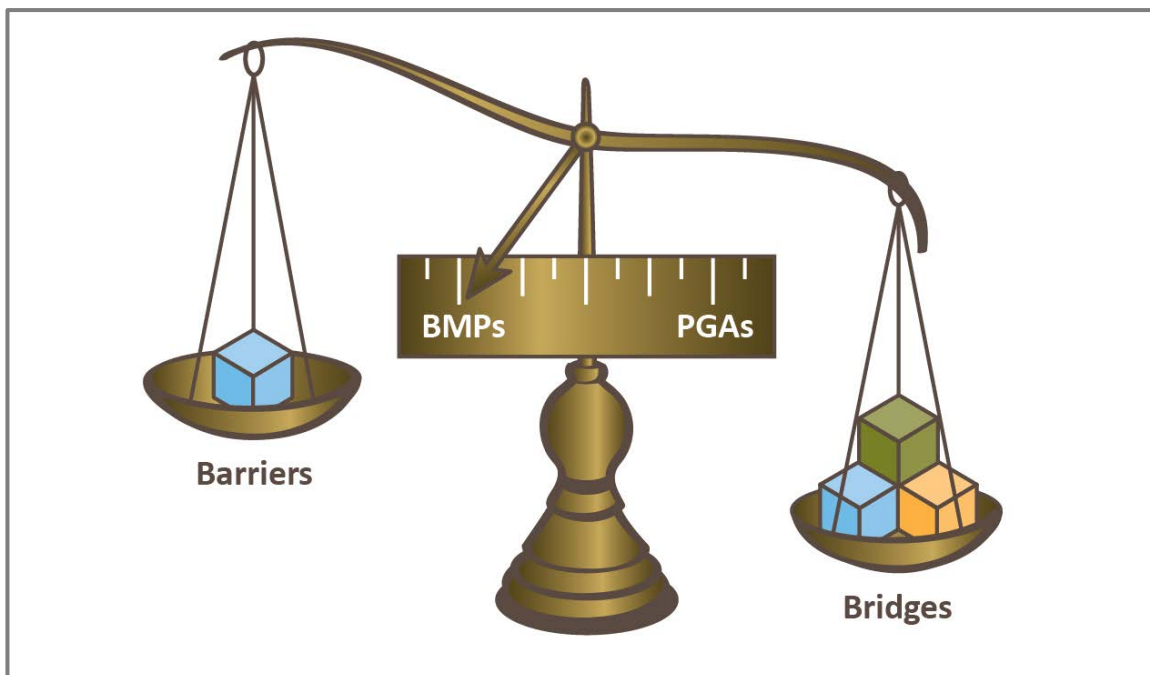
Figure 5.23: Step 2-A Task 3 Review Checklist



## Step 2 - B

### Targeted Changes to Barriers and Bridges

**Step 2-B** deals with the establishment of bridges toward positive behavioral change. Bridges are the opposite of barriers. They influence behaviors "positively" either by promoting the implementation of BMPs or by reducing the impact of PGAs. Returning to the analogy introduced in **Step 2-A (Task 2)** above, the starting point for planning was an "imbalance" of the balancing scale in the direction of PGAs. As illustrated in **Figure 5.24**, the purpose of targeting is to set measurable objectives for restoring this balance in the direction of BMP implementation. This is achieved by increasing the weight of the bridges on the scale.

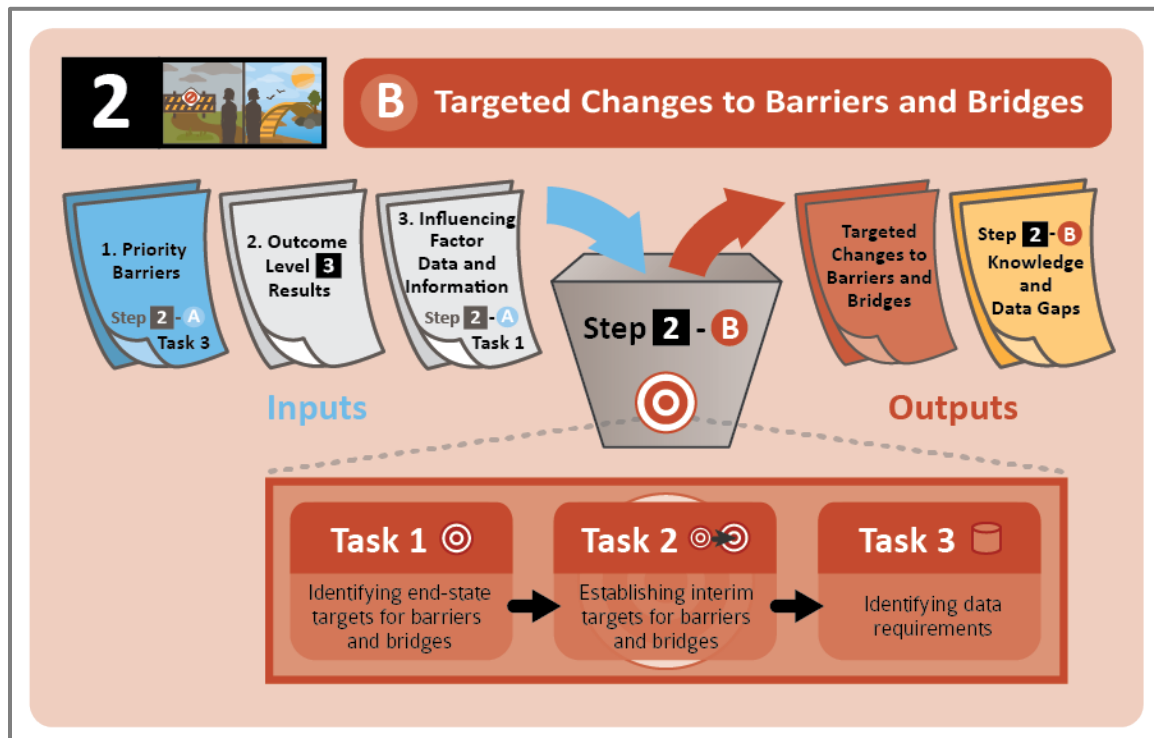


**Figure 5.24: A Balance of Barriers and Bridges that Favors BMP Implementation**

In **Step 2-A**, barriers were evaluated and their respective priorities determined. Once a barrier is determined to be a priority, and therefore warranting a resource commitment, managers can project the changes they want to see in it. **Step 2-B** provides guidance for targeting those changes.

The figure below identifies the inputs that are necessary for this planning step, the three tasks that need to be completed based on the inputs received, and the outputs that will be used to inform the next step in the planning process. Each task is described in additional




detail below. As shown in **Figure 5.25**, targeting changes entails three distinct tasks. Targeting the specific outcomes that will constitute success is the first critical step in the development of management strategies. This provides a measurable basis for forecasting outcomes, and for measuring and evaluating change. Interim targets define an incremental pathway toward the achievement of longer-range goals. Once a pathway for achieving changes is projected, the metrics and methods needed to document and support their evaluation can be established.



**Figure 5.25: Targeted Changes to Barriers and Bridges (Step 2-B)**

### 🎯 **Task 1 Identifying end-state targets for change**

This task addresses the identification changes in barriers and bridges needed to facilitate positive behavioral outcomes. It addresses two general questions.

 <b>Step 2-B Task 1 Key Questions</b> Identifying End-state Targets		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>Priority Problems (Barriers)</b> 	<b>Question 1:</b> What are the end-state targets for change?  <b>Question 2:</b> When should the end-state targets be achieved?	<b>End-state Targets for Barriers and Bridges</b> 

### Question 1 What are the end-state targets for change?

On completion of Step 2-A above, managers should understand what the barriers are for each priority behavior. The next step will be to determine the changes they will seek in them. This will entail either a reduction in barriers or an increase in bridges. Targeting should always be considered provisional, and returned to periodically as results accumulate. In setting targets, the following should be considered.

#### Nature of the targeted change

Following on the categories of barriers previously identified, targeted changes can be grouped according to three corresponding types.

- Inhibition of PGAs.** A change is targeted to inhibit the presence of an existing PGA (e.g., a regulatory ban of a pesticide). The bridge can either reduce or eliminate a barrier.
- Strengthened support for existing BMPs.** A change is targeted to increase the magnitude or prevalence of an existing factor to more actively support BMP implementation (e.g., increase existing awareness of proper techniques for applying pesticides). The bridge can either replace or offset a barrier.
- Support for BMP alternatives.** A change is targeted to actively support the implementation of an identified BMP alternative (e.g., incentivizing the cost of a less toxic product). The bridge can either replace or offset a barrier.

As an example, regulatory factors that serve as barriers were discussed above. Conversely, there may also be laws or regulations that support the desired BMPs or behaviors and, therefore, establish a bridge (e.g., bans for the use of certain pesticides, bans on the use of plastic bags). Ordinances can be very effective when used in concert with an inspection

program (e.g., they can be implemented for commercial businesses to stop a PGA or implement a BMP). Whenever a PGA is eliminated due to a regulatory requirement, it is essential that education regarding an acceptable alternative behavior is offered to the target audience.

## Magnitude of changes

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Determining how much change is needed is one of the most challenging parts of the targeting process. For reducing barriers, there's no easy answer since multiple factors tend to act together, and the respective strength of their influences is not usually well-known. Since the bottom line is the net change across all factors, more success with one may allow for less with another. Conceptually, there are a few obvious starting points. The first of these is the total elimination of one or more barriers. Targeting to elimination is tempting because it eliminates ambiguity. If a barrier is gone, it cannot contribute to a PGA. However, while conceptually simple, elimination of barriers is not usually realistic. It generally makes more sense to seek targeted, measurable changes that can be evaluated and modified over time.



### Setting Targets to Comply with Regulatory Requirements

Setting targets to regulatory requirements, particularly those established in permits, should always be considered up front. Most permits do not set explicit requirements for changes in influencing factors, but some do require measurable increases in knowledge and awareness in target audiences. These should be adhered to if applicable.



### Setting Targets to Achieve Specific Level 3 Changes

This should be the preferred approach when targets have been defined for higher outcome level changes, and their relationship to the behavior is quantifiable. Since the magnitude of behavioral changes is assumed to be a function of the magnitude of its influencing factors, an increase or decrease in one should cause a corresponding change in the other. Ideally both endpoints are known and quantifiable. Where they are not, relationships between them can still be explored "experimentally" as described below.



### Setting Targets to Resource Availability



Setting targets to resource availability is often necessary because programs don't always have the staffing, budget, or other resources needed to pursue targets for influencing factors established through other approaches. Resource availability presents



real world constraints that must be considered, although it's important to remember that targets which are too low may not be effective. Rather than under-targeting because of resource limitations, it may make more sense to defer targeting some changes until additional resources can be obtained, or to divert those existing resources to another influencing factor. In early stages, the resource implications of characterizing influencing factors may tend to take precedence over those needed to pursue changes.



### **Setting Targets to Learn and Adapt**

This approach involves establishing targets to explore the potential for changing the nature, magnitude, or “mix” of existing influencing factors. Because barriers and bridges are sequentially linked both to level 3 and 1 conditions, managers can benefit from exploring relationships to higher and lower level outcomes. One way of approaching this is through the establishment of **stretch targets**. For example, if 25% of a target audience is currently aware of a problem, a goal of 30% could be targeted over a defined period, and existing facilitation activities “dialed up” to try and achieve the change. Results could be periodically evaluated to see if increases are resulting and to adjust implementation strategies accordingly. An advantage to stretch targeting is that it allows efficiencies to be evaluated as activities are incrementally increased.

**Experimental targets** allow the exploration of relationships and testing of hypotheses. In the absence of specific information on the relationship of influencing factors to higher level changes, managers will often need to take a trial-and-error approach. Specific levels of change can be targeted and tracked along with ongoing assessment of behavioral change or program implementation. By exploring potential causal relationships, managers can learn what works and what doesn't.




## **Question 2 When should end-state targets be achieved?**

Depending on the types of changes that are targeted, significant periods of time may be needed to reduce barriers or build bridges to behavioral change. In instances where programs exert a high degree of direct control (e.g., through building or grading permits), changes can occur very quickly, but in most instances managers should realistically expect that years or decades may be needed. Timeframes will tend to be shorter for target audiences that are influenced by regulations (commercial and industrial audiences) or municipal employees since the messages and target audience can be better controlled. For residential target audiences, barriers and bridges may be primarily addressed by voluntary actions, and may tend to take considerably longer.



## Task 2 Establishing interim targets for influencing factors

This step identifies approaches to establishing the interim targets to assist in evaluating progress towards achieving the end-state targets. The key questions below can be used to identify the interim targets for the barriers and bridges.

 <b>Step 2-B Task 2 Key Questions</b> Establishing Interim Targets		
<u>Inputs</u>	<u>Key Questions</u>	<u>Outputs</u>
<b>End-state Targets for Barriers and Bridges</b> 	<b>Question 1:</b> What interim targets are needed to evaluate progress toward the end-state target?  <b>Question 2:</b> When will interim targets be achieved?	<b>Interim Targets for Barriers and Bridges</b> 

### Question 1 What interim targets are needed to evaluate progress toward the end-state target?

Change is not linear, so managers should be realistic about what they can expect to see at any particular point in time. Consider a residential population with 5% overall awareness that overwatering of lawns contributes to pollution. If a 10-year goal of bringing this awareness to 80% is established, it would be naïve to expect that 1/10<sup>th</sup> of this goal (i.e., a 7.5% increase) would be achieved each year. Realistically, allowances need to be made for the time it takes to “ramp up,” refine, and fully implement a program. Likewise, there will be a point at which maximum gains should be expected, and quite possibly diminishing returns beyond after that. While it’s straightforward enough to anticipate such changes in concept, it’s not possible to accurately predict the curve.

Interim targets establish milestones along the way necessary to realistically anticipate critical events in the implementation curve, and to make adjustments in response to results. They allow progress to be measured and strategies to be adjusted along the way. They’re critical to adaptive management.

## Question 2 When will interim targets be achieved?

Timeframes for interim targets should reflect the initial schedule set for achieving the end-state condition, the need for specific feedback along the way, and the ability to measure change over interim periods. Interim targets should not be set so aggressively that it will be difficult to obtain useful feedback.



## Task 3 Identifying data requirements

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Now that targets for changes in barriers and bridges have been identified, it's necessary to identify how they will be measured, what data are needed to allow measurement, and how data will be collected and analyzed. Planning is not complete unless managers are ready to obtain and evaluate the data needed to assess each targeted change. Each of the questions below should be addressed for every targeted outcome addressed in **Step 6-B**.

### Question 1 What metrics will be used?

Changes to influencing factors should both be expressed in unambiguous terms. This should include a specific formulation of the outcome statement, the assignment of units of measure or assessment, and units of time. **Section 7.3** provides additional detail on the establishment of metrics.

### Question 2 What data collection methods will be used?

It's also essential that managers identify how data will be collected for each targeted barrier or bridge so that it can be tracked and assessed. **Section 7.4** provides additional detail on potential data collections options.

### Question 3 What data analysis methods will be used?

The last consideration for any targeted influencing factor is how the data will be evaluated. The choice of analytical method can dictate what specific metrics should be used, how the data should be collected, and the quality of the result. **Section 7.5** provides additional discussion of data analysis options. Where the establishment of receiving water data requirements cannot be satisfactorily addressed up front (e.g., there's no available option for collecting the desired data), this may need to be documented as a knowledge and data gap (**Step 6-C**).

**Figure 5.26** provides a Review Checklist to guide Step 2-B completion.



## Review Checklist



### Step 2-B Tasks 1, 2, and 3

#### Targeted Changes to Barriers and Bridges

Apply this task individually to all barriers identified in Step 2-A. Its purpose is to identify specific targets for change in these conditions.

#### ✓ End-state Targets (Task 1)

Consider the following questions:

Question 1: What is the end-state for the barrier or bridge?

Question 2: When should the end-state condition be achieved?

#### ✓ Interim Targets (Task 2)

Consider the following questions:

Question 1: What interim targets are needed to evaluate progress toward the end-state barrier or bridge?

Question 2: When will interim targets be achieved?

#### ✓ Data Requirements (Task 3)

Consider the following questions:

Question 1: What metrics will be used?

Question 2: What data collection methods will be used?

Question 3: What data analysis methods will be used?

✓ For each priority barrier or bridge, document interim and end-state targets, and the data requirements necessary to track and evaluate them.

✓ Compile one or more lists of targeted changes to barriers and bridges and supporting documentation for listed conditions.

✓ If a priority change to a barrier or bridge is not or cannot be targeted, document the reason.

✓ Document all Step B data and information gaps.

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**Figure 5.26: Review Checklist for Targeting Changes to Influencing Factors**



## Step 2 - C

### Documenting Knowledge and Data Gaps

The identification of knowledge and data gaps should be ongoing throughout the entire Level 2 planning process. At its conclusion, managers should have developed a list of gaps that can be incorporated into a Monitoring and Assessment Strategy. **Section 7.0** provides additional guidance on assessment tools and strategies to support the development of these strategies. Because an existing baseline of data and information does not exist for many influencing factors, Level 2 knowledge and data gaps are likely to be significant. Critical gaps must be addressed to ensure that they are resolved over time.

**Table 5.19** provides examples of general areas of inquiry where Level 2 knowledge and data gaps are likely to be encountered. These are intended to provide a framework for identifying actual knowledge and data gaps, which will be much more specific than those listed here.

**Table 5.19: Potential Areas of Influencing Factor Knowledge and Data Gaps**

- ✓ Understanding of potential influencing factors (nature, magnitude, prevalence, distribution, variability, and trends)
- ✓ Availability and adequacy of data (sample size, representative sampling, etc.)
- ✓ Knowledge of regulatory requirements and constraints
- ✓ Knowledge of economic factors
- ✓ Knowledge of social factors
- ✓ Methodologies, criteria, and data support for conducting problem identification
- ✓ Methodologies, criteria, and data support for prioritization

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