IMPLEMENTATION GUIDELINE NO. 28

In accordance with Council resolution on 29 May 2025, this implementation guideline ceases to have effect from 1 July 2025

Ipswich Planning Scheme

Dispersive Soil Management

Date of Council Resolution

These guidelines were adopted by Council on 19 February 2013 and took effect from 25 February 2013 in accordance with section 2.3(2) of the Planning Scheme. The guidelines were amended by Council on 26 April 2016 and took effect on 6 May 2016.

Purpose of the Guidelines

This guideline sets out matters that need to be considered in managing development in areas containing dispersive soils. These soils are highly erodible and vulnerable to sheet, tunnel and gully erosion. These guidelines complement the stormwater management requirements of Implementation Guideline No. 24 - Stormwater Management and general legislative obligations requiring the prevention of erosion and the transportation of sediment.

Council's Implementation Guidelines are intended to apply a standard approach to the interpretation and implementation of the relevant aspects of the Planning Scheme. They offer a degree of certainty to applicants, Council and the community. Where an applicant is proposing a solution that is different from the guidelines the onus is on the applicant to demonstrate the facts and circumstances to support the solution. This guideline does not preclude alternative innovative solutions proposed by the developer or applicant.

Guidelines

1 Background

Dispersive soils exist throughout Ipswich. They include large areas dominated by Sodosols that are known to be particularly vulnerable to dispersion and erosion (refer to Map 1 – Soils of Ipswich Map). Other clay-rich soils such as Chromosols, Dermosols, Vertosols and some Hydrosols and Kandosols are also vulnerable to dispersive erosion.

Dispersion occurs when sodic soils (normally subsoils) are exposed to non-saline water including rainwater, resulting in the swelling of clay platelets and the collapse of clay aggregates. Dispersion is often seen as 'muddy' or 'milky' water in dams and surface water and dispersion can lead to tunnel erosion. Tunnel erosion can cause significant damage to physical infrastructure and buildings where undermining may occur and the surface may slump or collapse into voids and cavities that has been formed by soil dispersion.

In almost all cases, tunnel erosion results from the surface disturbance of soil allowing rainwater or stormwater to come into contact with dispersible subsoils.

Changes to hydrology, including concentrating flow in culverts, runoff from hardstand areas, ponding of rainfall and land contouring increases the risk of tunnel erosion.

Typical activities that increase the risk of exposing dispersive subsoils to rainfall and stormwater include:

- the removal of topsoil;
- soil excavation and ground profiling;
- trenching and supply of services;
- road and culvert construction; and
- the construction of dams and detention basins.

Figure 1.1 - Tunnel erosion and slumping along a drainage line

Development in areas containing dispersive soils has the potential to increase the incidence of infrastructure damage and environmental harm (eg adversely affect water quality) resulting from tunnel and surface erosion. The repair of tunnel erosion is also often expensive, difficult and prone to re-failure.

The management of dispersive soils therefore requires a focus on prevention rather than intervention, and a shift in standard construction techniques and development practices (refer to Section 5 below).

Figure 1.2 - Large scale tunnel and gully erosion in highly dispersive soils, Centenary Highway

Figure 1.3 - Erosion and dispersion along service trench

Figure 1.4 - Batter erosion to dispersive subsoils

2 Identification of Dispersive Soils

Map 1 – Soils of Ipswich Map identifies the spatial distribution of the major dominant soil types in Ipswich based on the Australian Soil Classification Orders. The mapping has been produced to assist in broad scale soil identification focusing on the classification of dominant soil types only.

Those areas mapped as containing Sodosols are likely to contain dispersive soils or subsoils and development in these areas that meet or exceed the thresholds in Table 3.1 requires the development of a management plan unless it is demonstrated that dispersive soils / sub-soils are not present.

Field testing is able to be conducted to identify dispersive soils by observing the behaviour of air dried aggregates in distilled water or rainwater. The following steps should be followed, or the Emerson crumb test used as an initial test to identify soil susceptible to dispersion.

Step 1 *Collect soil aggregates (2 or 3 pea sized soil aggregates / 1-2cm in diameter) from each layer in the soil profile representative of the soil layers.*

Step 2 *If moist, dry the aggregates in the sun for a few hours until air-dried (Note: aggregates may not disperse when they should if they have not been sufficiently dried).*

Step 3 *Gently place the selected aggregates in a shallow glass or jar of distilled water or rain water.*

Step 4 *Leave the soil aggregates on a stable surface without shaking or disturbing them for 2 hours.*

Step 5 *Record the results to determine the level of dispersion observed (refer to Figure 2.1 below).*

Where evidence of dispersion is recorded, additional management techniques and the preparation of a management plan may be required (refer to Section 3 below).

Further testing using approved Australian Standard techniques may also be required, particularly where results of the field testing is inconclusive, or where large areas are likely to be disturbed by development, including for the construction of infrastructure.

3 Thresholds and Dispersive Soil Management

Development within areas containing dispersive soils (refer to Section 2 above) that meet or exceed the thresholds contained in Table 3.1 are required to provide a Dispersive Soil Management Plan (DSMP) as part of a comprehensive Erosion and Sediment Control Plan.

The DSMP is to be submitted to Council in a format that satisfies the requirements of Section 4 below. The DSMP must compliment and integrate with stormwater management undertaken in accordance with Implementation Guideline No. 24 - Stormwater Management.

The DSMP should also address areas of difficult topography, with soil disturbance in areas of greater than 20% slope avoided.

All other development undertaken in areas containing dispersive soils, including works such as landscaping and the installation of pools that would not normally require land use approval should ensure that adequate measures are taken to manage erosion and sediment control.

Ground disturbance and earthworks, particularly to sub-soils should be minimised and regard given to the management of dispersive soils as outlined in Section 5 below.

Figure 2.1 Aggregate dispersion results

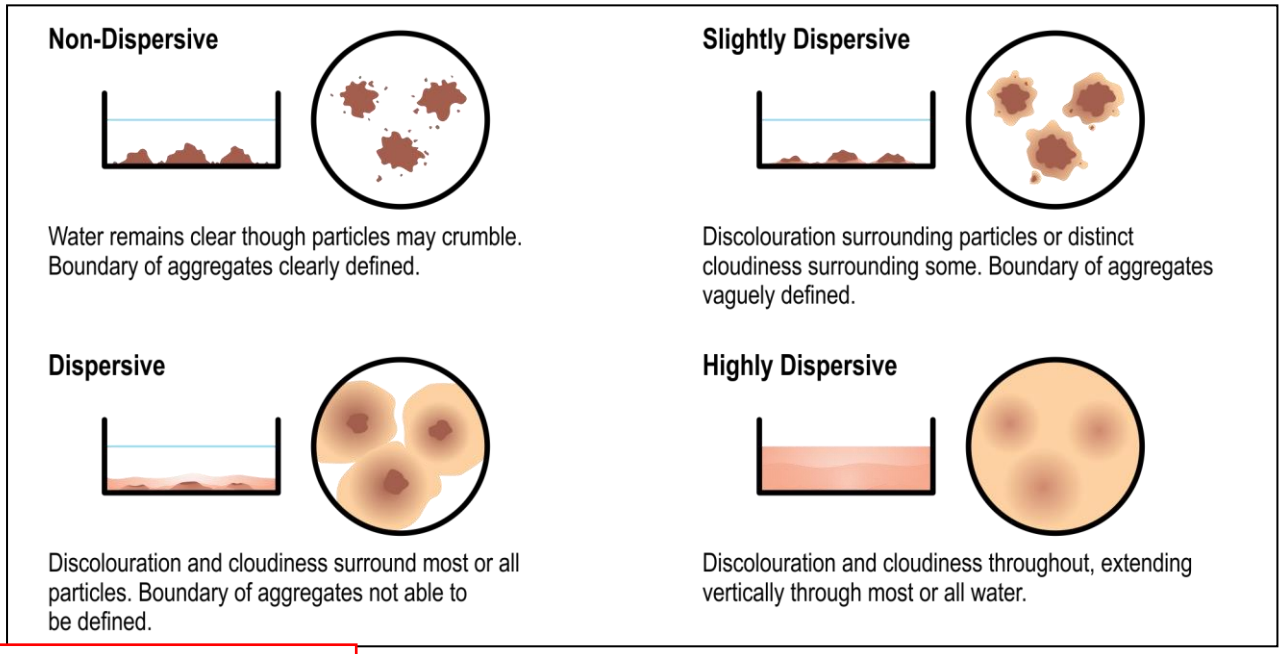


Table 3.1 Thresholds for Dispersive Soil Management Plan

Development Type	Threshold
Material change of use within an area containing dispersive soils	(a) Includes newly constructed road exceeding 30m in total length. (b) 6 or more additional dwellings (attached or unattached). (c) Disturbing greater than 2500m^2 of ground.
Reconfiguration of a lot within an area containing dispersive soils	(a) Includes newly constructed road exceeding 30m in total length. (b) Would result in 6 or more residential allotments or that provides for 6 or more dwellings. (c) Disturbing greater than 2500m^2 of ground.
Operational works within an area containing dispersive soils	(a) Disturbing greater than 2500m^2 of ground.

4 Dispersive Soil Management Plans

This section outlines Council's expectations in relation to the reporting and presentation requirements for the preparation of a Dispersive Soil Management Plan (DSMP).

DSMP's are generally required to be submitted with the initial Material Change of Use and Reconfiguration of Lot application prior to Operational Works.

4.1 Reporting Template

Table 4.1 provides a recommended reporting template for a DSMP submitted to Council. This template is not prescriptive, but provides an indication of the type of information that Council will typically require for most developments. It should be noted however, that conformity with the template does not guarantee that all relevant issues have been addressed.

Table 4.1 Recommended Reporting Template for DSMP's

Section	Contents
Cover Page	
Document Information Page	This page should outline information relevant to the authorship of the DSMP (ideally provided in tabular form), including document title (reference number, date and version tracking), document ownership (including names of personnel that have issued and checked the DSMP), RPEQ certification or suitably qualified and experienced professional (eg soil scientist) plus registration number, name of client and site address.
Summary	Concise summary of study methodology and findings.
Responses to Information Request	Details of how (if any) previous information request(s) from Council have been addressed.

Table 4.1 continued over page.

Table 4.1 Recommended Reporting Template for DSMP's continued

Section	Contents
Table of Contents	
1. Introduction	General description of proposed development/works, existing site, scope of DSMP and names of the project team members.
2. Site Constraints	General description of site limitations that commonly affect on-site erosion and sediment control measures, grouped into five main categories: Soil; Topography; Water; Vegetation; and Ecology. Included should be a detailed site plan showing: (i) location of site / property boundaries; (ii) accurate location of boreholes (including reduced level) and proposed earthworks; (iii) site contours and drainage paths (existing and final); (iv) soils and associated risk mapping; (v) difficult topography and associated hazard mapping; and (vi) map scale suiting site area/features (maximum 1:2000).
3. Soil Data	Document soil sampling, testing and interpretation of test results, notably in terms of dispersion and erosion potential.
4. Erosion Risk Mapping	Aim to identify: zones of various erosion risk; areas where soil disturbance should be avoided; and well-defined links between assessed risks and the required construction practices and erosion and sediment control design standards.
5. Recommendations	Recommendations based on the assessment undertaken and requirements of Ipswich City Council (Planning Scheme Policy 3) and should include: (i) any specific soil characteristics (eg fine grained and dispersive soils); (ii) suggestion of alternative construction practices and top soil management to reduce present and future erosion (particularly tunnel) impacts; and (iii) areas where disturbance of very high risk/dispersive soils is to be avoided.
6. Conclusions of the erosion assessment	Summary of site constraints, erosion hazards and recommended outcomes.
7. Appendices	Include bore logs and copies of all laboratory test results.

5 Management of Dispersive Soils

The prevention and management of erosion may be achieved using a combination of the following:

- identification and avoidance of dispersive soils;
- soil re-compaction;
- chemical amelioration;
- use of sand blocks and barriers (refer to Figure 5.2); and
- use of non-dispersive topsoil and revegetation.

The following checklist may be used to reduce the risk of soil dispersion:

✓ Apply gypsum to potentially dispersive soils.

Note: The application of chemical treatments including gypsum should avoid harmful changes to pH levels, particularly when in close proximity to waterways (eg 20m from top of bank). The mechanical application of chemical amelioration should also be avoided in areas intended for tree/vegetation retention.

✓ Minimise the amount of time land is exposed (eg by staging development).

✓ Discharge stormwater and runoff into relatively erosion resistant areas (eg garden beds mixed with gypsum, existing well vegetated areas with ample topsoil and stony elevated areas) away from dispersive soils.

Note: Stormwater discharge should not adversely impact on riparian and waterway corridors.

✓ Use rainwater tanks to capture runoff from roofs and buildings and pipe overflow to relatively erosion resistant areas.

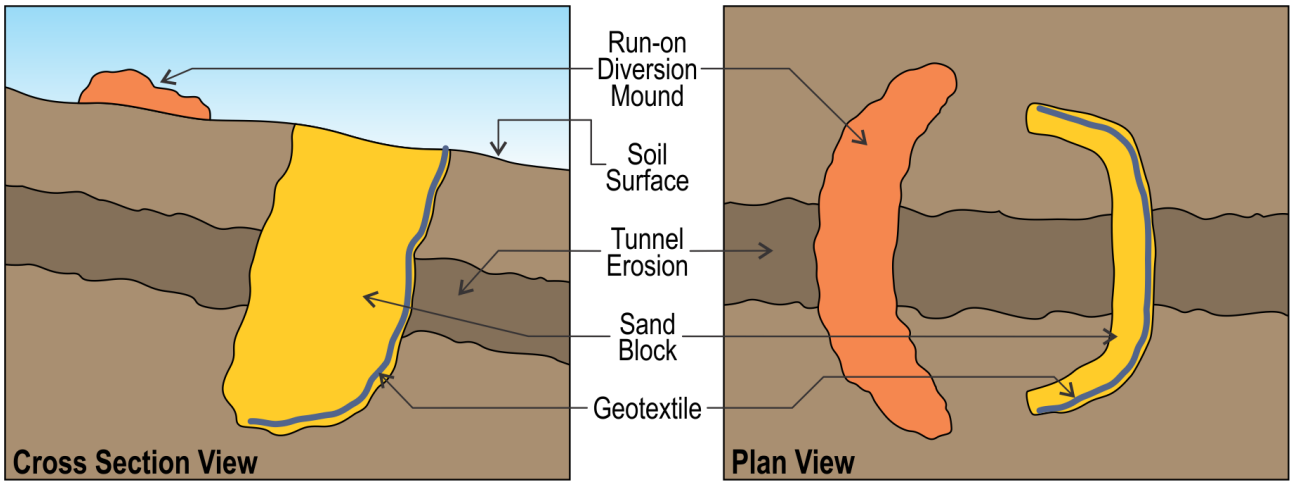
Figure 5.1 - Revegetation of major servicing trench

✓ Cover exposed dispersive soils with topsoil (at least 150mm deep) and use geotextile barriers.

✓ Re-vegetate exposed areas, particularly areas of steep slopes.

✓ Captured runoff should be dissipated and spread over as wide an area as possible.

Figure 5.2 Modified Sand Block Design



The depth of the sand block is determined by the depth of dispersive soils or tunnel erosion.
The span length of the structure is determined by the width of the tunnelling.

Figure 5.3 - Chemical treatment, use of geotextiles and landscaping to stabilise detention basin

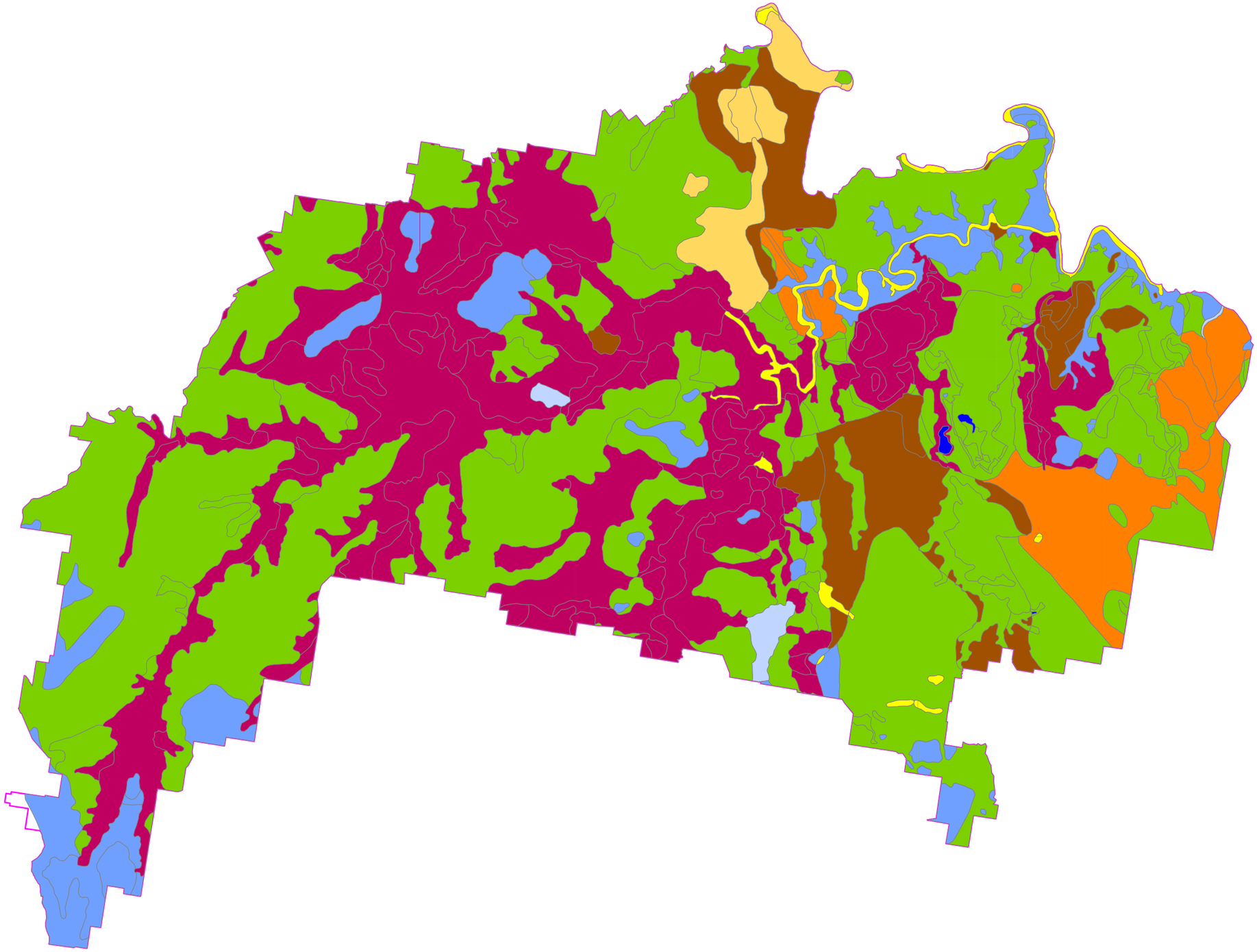
The following actions should be avoided to reduce the risk of soil dispersion:

- Expose dispersive subsoils to rain.
- Allow water to pond on dispersive soils.
- Stockpile or spread dispersive soils.
- Concentrate stormwater in drainage lines containing dispersive soils.
- Use table drains, trenches or cut and fill construction techniques in areas containing dispersive soils (unless appropriate measures are implemented in accordance with an approved DSMP).
- Extract topsoil or re-profile land in areas with dispersive subsoils (unless an appropriate management plan is prepared and utilised).
- Clear vegetation or profile soil in areas of difficult topography, particularly where greater than 20% slope (unless appropriate measures are implemented in accordance with an approved DSMP).

Services such as electricity, telecommunications and water are usually provided via trenches in urban areas. Where trenching is undertaken in dispersive soils, the use of chemical amelioration, sand blocks and compaction methods is likely to be required to reduce the risk of dispersion occurring.

Advice should be sought from a suitably qualified and experienced professional (eg RPEQ engineer or soil scientist) where a management plan is required to be submitted to Council.

MAP 1: Soils of Ipswich Map



Legend

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City of Ipswich

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- Dermosols
- Hydrosols
- Kandosols
- Kurosols
- Leptic Rudosols
- Sodosols/Chromosols
- Stratic Rudosols
- Tenosols
- Vertosols
- Water

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